Office of the Commissioner for Aquaculture Development

OCAD
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Study No. 2

Market Outlook in the International Fish & Seafood Sector

Canadian Perspective

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by
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FOREWORD

This study is one of seven background studies commissioned or prepared by the federal Office of the Commissioner for Aquaculture Development (OCAD) as part of its review of the federal role in aquaculture.

In order to provide a report on the federal role for the Minister of Fisheries and Oceans, the Office of the Commissioner has undertaken a series of background studies pertaining to aquaculture. The studies are:

Study 1 : Current Status and Potential of the Canadian Aquaculture Industry: a review of the context in which the Canadian aquaculture industry is evolving today, and an assessment of its potential for future growth;

Study 2 : International Fish and Seafood Markets: a Canadian perspective: a review of general trends in international fisheries products markets (commercial fisheries and aquaculture) in light of major markets targeted by Canadian aquaculture products;

Study 3 : Market Outlook in the International Fish and Seafood Sector: Alternative Products/Uses and Food Safety Issues: a review of general trends affecting the value-added of fisheries products, new uses for products derived from aquaculture and commercial fisheries (pharmaceutical products, nutraceuticals, etc.), and issues affecting food safety, especially in terms of consumer behaviour and regulatory changes affecting international trade;

Study 4 : Review of Provincial and Territorial Program and Services in the Aquaculture Sector: a review and analysis of all programs and services provided to the Canadian aquaculture sector by provincial government ministries/departments and agencies;

Study 5 : Review of Federal Programs/Initiatives in support of Aquaculture: a review and analysis of all programs and services provided to the Canadian aquaculture sector by various federal government departments and agencies;

Study 6 : Federal Programs and Services for Five Resource-Based Industries: a comparative analysis of how the aquaculture sector is treated by the Canadian government, in comparison with four other primary sectors : agriculture, forestry, commercial fisheries and biotechnology;

Study 7 : The International Context for Aquaculture Development: Growth in Production and Demand and Long-Term Outlook: a review and comparative analysis of the international context and resulting major trends that will affect the development of aquaculture at the global, national and regional levels; includes an overview of policies, governance structures, programs and services in place in various countries to provide a framework and support for industry, and to foster smooth development of aquaculture; and, the lessons for Canada.

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International Fish & Seafood Markets
A Canadian Perspective

Section I: Supply Trends

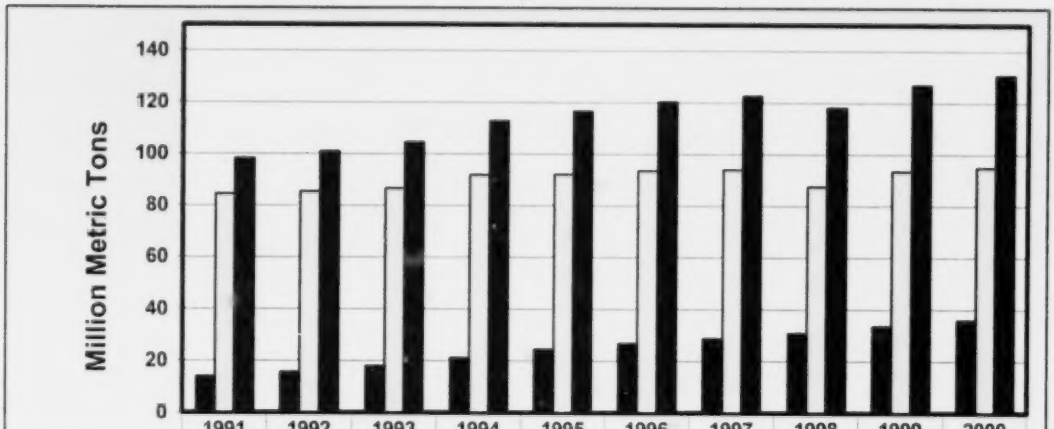
1. World Supply Situation

From 1991 to 2000, world production of fish and shellfish, both from capture (wild) fisheries and aquaculture, increased 33% to 130.4 million metric tonnes. (See Figure 1) The increase in production has come primarily from two sectors: industrial fishing and aquaculture. Catches from most fisheries that make up the bulk of international seafood trade have been stagnant or have declined over the past decade.

On a per capita basis, world seafood production has declined and any future increases in supply will come through aquaculture.

According to the United Nations Food and Agricultural Organization (FAO) the total 2000[1] world production included 94.8 million metric tonnes from capture fisheries and 35.6 million metric tonnes from aquaculture. When production of sea vegetables such as seaweed is included (estimated at 11 million metric tonnes wet weight), total aquaculture output exceeds 46.6 mmt.

Figure 1. World Fisheries and Aquaculture Production 1991 – 2000



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
■ Aquaculture	13.7	15.4	17.8	20.9	24.4	26.7	28.6	30.5	33.4	35.6
□ Wild Harvest	84.4	85.3	86.6	91.7	92.0	93.5	93.9	87.3	93.2	94.8
■ Total	98.1	100.7	104.4	112.6	116.4	120.2	122.5	117.8	126.6	130.4

Source: FAO

[1] The last year for which data is available.

For 2000, the FAO estimates that 74.1 percent of world fishery products were for human consumption with the balance utilized as fish meal and fish oil. Applying the 74 percent figure would result in a seafood supply for 2000 of 96.6 million metric tonnes with aquaculture contributing just over 37 percent of the total.

Leading Fisheries Producers

By a wide margin, China is the world's leading fisheries producer (see Table 2) accounting for almost a third of the world's production. Since 1980, when China instituted its market reform policy, the country's capture fishery catch has increased from approximately 4 million metric tonnes to just over 17 million metric tonnes in the year 2001. Of this total, about 84% came from saltwater fisheries and 16% from freshwater fisheries.

China's rapid growth in production, however, has come at a price, as many of the country's fisheries resources have been overfished. In an effort to conserve its fish stocks, China has officially adapted a "zero-growth" policy on ocean catches. In addition, the Chinese government has instituted seasonal fishing bans along most of its coast and in some lakes and rivers to protect spawning stocks.

Table 1. Top 20 World Wild (Capture) Species 1994 – 2000

Thousand Metric Tonnes

	SPECIES	1994	1995	1996	1997	1998	1999	2000
1	Anchoveta (Peruvian anchovy)	12,521	8,645	8,864	7,685	1,729	8,723	11,276
2	Alaska pollock	4,375	4,809	4,548	4,487	4,049	3,362	3,025
3	Atlantic herring	1,930	2,354	2,329	2,534	2,422	2,404	2,370
4	Skipjack tuna	1,498	1,573	1,588	1,617	1,889	1,988	1,890
5	Japanese anchovy	821	972	1,254	1,667	2,094	1,820	1,726
6	Chilean jack mackerel	4,262	4,995	4,379	3,597	2,026	1,423	1,540
7	Largehead hairtail	1,081	1,244	1,283	1,206	1,436	1,419	1,480
8	Chub mackerel	1,531	1,581	2,178	2,423	1,925	1,946	1,456
9	Capelin	884	749	1,527	1,605	985	905	1,466
10	Blue whiting	495	542	631	712	1,185	1,319	1,420
11	Yellowfin tuna	1,107	1,055	958	1,090	1,084	1,088	997
12	Atlantic cod	1,249	1,270	1,342	1,375	1,213	1,094	945
13	European pilchard (sardine)	1,167	1,220	996	999	950	907	943
14	Argentine shortfin squid	506	521	656	980	665	1,091	929
15	Araucanian herring	341	127	447	441	318	782	723
16	Atlantic mackerel	855	794	560	559	668	618	674
17	European sprat	580	602	672	700	696	684	660
18	Akiami paste shrimp	345	407	461	496	587	599	639
19	European anchovy	504	619	528	502	507	603	605
20	Gulf menhaden	767	472	491	598	497	694	591

Source: FAO FishStat

As conservation efforts have increased, China has placed a strong emphasis on increasing aquaculture production, both for domestic production and for export markets. As a result, China's annual aquaculture production has increased from less than 2 million metric tonnes to 25 million metric tonnes. While the farming of low-value freshwater species like carp still dominate production volumes, China is farming more seafood along its long coastline. In 2001, China' s saltwater aquaculture

production reached 8.5 million metric tonnes, an increase of 10% over the previous year. A growing percentage of this production is of higher-value seafoods such as shrimp, scallops and a variety of finfish including European turbot, flounder, sea bream and sea bass.

(It should be noted that China's fisheries statistics are likely to be somewhat inaccurate. Chinese provincial officials are still given production goals and officials in the Bureau of Fisheries acknowledge unofficially that there is a tendency to alter production data in order to meet target goals. Inflated reporting is probably more of a problem with aquaculture production, as this area has been designated a high-priority growth industry in China.)

Two of the other top five fisheries producers, Peru and Chile, produce large quantities of small pelagics such as anchoveta and pilchards that are used primarily for fish meal and fish oil. Catches of these species typically decline dramatically in years when an El Niño is present. In 1998, for example, production from Peru and Chile declined 44% from the previous year due to a strong El Niño.

Japan remains a substantial fisheries producer in spite of the fact that from 1991 to 1999, Japanese landings declined 47%, as catches from Japanese high seas fisheries dropped dramatically. The decline in Japan's high seas catch is due to several reasons. Firstly is the reduced access to fishing zones of other countries, a long-term trend that began in the late 1970s when a number of countries including Canada and the U.S. declared 200-mile limits. Secondly is the fact that other countries, especially China, are replacing Japan (and to a lesser extent Taiwan and South Korea) as lower cost operators of high seas fleets.

Table 2. Leading Countries - Capture Fishery ('000 Metric Tonnes)

	Country	1990	1994	1995	1996	1997	1998	1999	2000
1	China	6,715	11,018	12,713	14,334	15,907	17,400	17,240	16,987
2	Peru	6,869	11,999	8,938	9,515	7,870	4,340	8,429	10,658
3	Japan	9,760	6,756	6,119	6,089	6,078	5,382	5,176	4,989
4	United States	5,620	5,653	5,299	5,061	5,055	4,736	4,750	4,745
5	Chile	5,354	7,837	7,684	6,908	5,990	3,463	5,051	4,300
6	Indonesia	2,565	3,326	3,515	3,573	3,803	3,974	4,149	4,140
7	Russian Federation	7,603	3,713	4,322	4,695	4,689	4,485	4,141	3,974
8	India	2,862	3,300	3,312	3,569	3,614	3,314	3,317	3,594
9	Thailand	2,498	3,012	3,013	3,004	2,878	2,900	3,005	2,923
10	Norway	1,800	2,551	2,709	2,822	3,048	3,030	2,620	2,703
11	Iceland	1,521	1,571	1,624	2,075	2,225	1,700	1,736	1,983
12	Philippines	1,833	1,852	1,866	1,789	1,810	1,836	1,870	1,893
13	Republic of Korea	2,497	2,385	2,342	2,437	2,227	2,040	2,120	1,823
14	Denmark	1,476	1,873	1,999	1,682	1,827	1,557	1,405	1,534
15	Vietnam	752	960	1,000	1,029	1,079	1,131	1,200	1,442
16	Mexico	1,425	1,229	1,380	1,499	1,532	1,188	1,202	1,314
17	Malaysia	957	1,069	1,117	1,135	1,177	1,158	1,252	1,289
18	Taiwan	1,111	967	1,010	968	1,038	1,092	1,100	1,093
19	Myanmar	727	746	751	602	780	830	919	1,069
20	Bangladesh	690	771	792	815	829	839	959	1,004
21	**Canada**	**1,458**	**1,022**	**849**	**905**	**971**	**1,014**	**1,027**	**994**

Source: FAO

Japan is also a major aquaculture producer, with an annual production of about 1.3 million metric tonnes, almost all of it from marine farms. The primary species include seaweeds, scallops, oysters, flounders, yellowtail and sea bream. Production of aquaculture species is not expected to increase significantly in Japan, as there is a trend to shift production of some of these fish to China, where production costs are lower.

Fisheries production in the U.S., the world's fifth largest producer, has been relatively consistent over the past decade, due primarily to strong landings in Alaska, which produces about two-thirds of the U.S. catch of edible seafood (about 20% of the U.S. catch is menhaden, which is used for fish meal and oil). Almost a quarter of U.S. landings consists of Alaska pollock, the largest single species food fishery in the world. Most fish stocks in Alaska are in excellent shape and should continue to produce landings of between 2 and 2.5 million metric tonnes in the near future.

U.S. aquaculture production is relatively stagnant at about 500,000 metric tonnes a year, about 60% of which is freshwater catfish that is grown in states along the Mississippi Delta. With the exception of oysters and clams in the Pacific Northwest, and salmon in Maine and Washington State, coastal aquaculture in the U.S. is very limited due to an expensive, lengthy permitting process. Further expansion of coastal aquaculture in the U.S. is not likely due to strong opposition from both adjacent local landowners and environmental groups.

Fisheries production from Russia, the world's second leading producer in 1990, has declined almost 50% over the past 10 years, due primarily to smaller catches from the Russian Far East, where almost a decade of poaching and underreporting of fish catches have taken their toll. Russian catches of Alaska pollock, for example, will probably be less than the catch in Alaska. As recently as 1995, Russian fishermen were catching almost three times as much pollock as fishermen in Alaska.

In the context of world fisheries production, Canada's importance as a producer has eroded significantly over the past decade due primarily to a large drop in groundfish and wild salmon catches. Since 1990, Canadian annual seafood landings have declined 40% from 1.65 million metric tonnes to 991,000 metric tonnes in 2001. This decline has been offset somewhat by an increase in Canada's aquaculture production over the same period from about 36,000 metric tonnes to almost 125,000 metric tonnes.

It is important to note, however, that over the same period, the value of Canada's seafood landings has increased 36%, as catches of higher-value snow crab and shrimp have increased.

2. Top Ten Seafood Trading Countries

With combined annual trade of almost $30 billion in 2000, Japan and the U.S. dominate international seafood trade. (Note: unless otherwise indicated, all revenues are in U.S. dollars.)

Table 3. Top 10 Seafood Trading Countries

Country	1998	1999	2000
Japan	Imports: $12,827	$14,749	$15,513
	Exports: $ 718	$ 720	$ 802
	Total: $ 13,545	**$15,469**	**$16,315**
U.S.	Imports: $ 8,578	$ 9,407	$10,453
	Exports: $ 2,400	$ 2,945	$ 3,055
	Total: $10,978	**$12,532**	**$13,508**
China	Imports: $ 991	$ 1,127	$ 1,796
	Exports: $2,656	$ 2,960	$ 3,606
	Total: $3,647	**$ 4,087**	**$ 5,402**
Spain	Imports: $3,546	$ 3,287	$ 3,352
	Exports: $1,529	$ 1,604	$ 1,600
	Total: $5,075	**$ 4,891**	**$ 4,952**
Thailand	Imports: $ 833	$ 841	
	Exports: $4,031	$ 4,110	$ 4,367
	Total: $4,864	**$ 4,951**	
Denmark	Imports: $1,704	$ 1,772	$ 1,806
	Exports: $2,898	$ 2,884	$ 2,756
	Total: $4,602	**$ 4,656**	**$ 4,562**
France	Imports: $3,505	$ 3,281	$ 2,984
	Exports: $1,097	$ 1,107	$ 1,096
	Total: $4,602	**$ 4,388**	**$ 4,088**
Canada	Imports: $1,195	$ 1,339	$ 1,389
	Exports: $2,265	$ 2,618	$ 2,818
	Total: $3,460	**$ 3,957**	**$ 4,207**
Norway	Imports: $ 675	$ 612	$ 597
	Exports: $3,661	$ 3,765	$ 3,533
	Total: $4,336	**$ 4,377**	**$ 4,130**
Italy	Imports: $2,809	$ 2,729	$ 2,535
	Exports:		
	Total:		

Sources: FAO, U.S. National Marine Fisheries Service (NMFS), Fisheries and Oceans Canada (DFO). In millions of U.S. dollars

Japan: Imports Rising, but Total Consumption Falling

As indicated in Table 3, Japan is the world's leading seafood importer with annual imports of more than $15 billion. Japan's seafood imports have risen steadily to offset the steadily declining production from the country's domestic fishing fleets. Japan's seafood supply is made up of 6.35 million metric tonnes of domestic production, including 1.35 tonnes from aquaculture and 3.1 million tonnes of imports. With a shrinking high seas fleet and less productive local waters, Japan's wild catch has fallen almost every year over the past decade and is currently 4.68 million tonnes lower than 1990 levels. While Japanese imports have grown consistently on a year-to-year basis, they have not offset the decline in domestic fishery landings.

In terms of volume, frozen tuna (yellowfin, bigeye, albacore, skipjack and bluefin) is Japan's leading import. In 2001, Japanese tuna imports totalled approximately 270,000 metric tonnes worth 112 billion yen in 2001.

In terms of value, shrimp is Japan's major imported seafood item (Japan is the world's second largest shrimp importer, ranking behind only the U.S.). In 2001, Japan imported 245,000 metric tonnes of shrimp worth almost 300 billion yen. Indonesia was Japan's largest shrimp supplier in 2001 with a market share of 22%, followed by India at 17%, Vietnam at 15% and Thailand 8%.

Japan is also the world's largest single market for salmon. Japan's salmon imports have risen steadily along with the increases in production of farmed salmon. The low salmon prices have contributed greatly to the increase in consumption, as salmon has become an affordable "everyday" fish for consumers. In 2001, Japan imported a record 243,000 metric tonnes of frozen salmon and 30,000 metric tonnes of fresh salmon worth 114 billion yen. Chile is Japan's leading salmon supplier, followed by Russia, the U.S. and Norway. In terms of species, coho was the most important imported species in 2001, accounting for 32% of Japan's salmon imports, followed by pink at 30%, sockeye at 18% and Atlantic at 14%.

In addition to salmon and shrimp, Japan imports large volumes of groundfish, most of which is imported as surimi[2], which is used as a raw material for a variety of products such as kamaboko[3] and seafood analogs[4]. In 2001, Japan imported 207,000 metric tonnes of surimi worth approximately 40 billion yen. The U.S., which exports surimi made from Alaska pollock, is the leading supplier with a market share of 45%.

Because of its large demand, Japan is also a large market for a wide variety of other species from all over the world. Among the more important species are Atlantic mackerel, squid, cuttlefish, crab and eels.

Although Japan is the world's largest seafood importer, the country's seafood consumption is declining, as per capita expenditures on seafood have been negatively impacted by both the country's lengthy recession and its aging population. Since peaking in 1993, Japan's per capita seafood consumption has steadily declined. In 1993, average household consumption of fresh and frozen seafood was 49.9 kilograms (live weight). By 2000, consumption had fallen to 43.6 kilograms.[5] (See section II, Trends in Leading Seafood Markets for additional information on Japanese seafood consumption trends.)

U.S.: Imports and Exports Keep Growing

The U.S. is also a major seafood importer, with imports that have almost doubled in value since 1996. Unlike Japan, however, the U.S. is also a major seafood exporter.

[2] Surimi: paste made from washed, minced, fish flesh, used as a basis for a number of food products.
[3] Kamaboko: seafood products made from pollock or codfish surimi.
[4] Seafood analogs: refers to artificial crab, shrimp and scallops, made from Alaskan pollock, for example.
[5] Source: Japan Ministry of Agriculture, Forestry and Fisheries

In 2001, U.S. edible seafood imports reached a record 1.86 million metric tonnes, an increase of 3% over 2000. The value of U.S. seafood imports declined 2%, however, to $9.9 billion, as the imported prices per pound for shrimp and salmon both declined sharply.

Shrimp is by far the most important seafood imported into the U.S., the world's largest market for this popular crustacean. U.S. shrimp imports have been rising steadily, although the rate of increase has jumped sharply in recent years. This marked increase is due to a slight decline in Japanese shrimp imports and increased aquaculture production from Southeast Asia, especially Vietnam.

In 2001, U.S. shrimp imports reached a record 400,000 metric tonnes, worth $3.6 billion. In terms of volume, shrimp imports were up 16%, while the value declined 3.5%. Thailand is the dominant supplier of shrimp to the U.S., accounting for 34% of its shrimp imports. Imports from Vietnam have increased very rapidly, growing from just 5,000 metric tonnes in 1998 to 33,000 metric tonnes in 2001, which made Vietnam the second leading shrimp supplier for the first time. Other large U.S. shrimp suppliers include India (32,000 metric tonnes), Mexico (30,000 metric tonnes), China (28,000 metric tonnes) and Ecuador (19,000 metric tonnes).

Tuna is the U.S.'s second most important seafood import. In 2001, the U.S. imported 316,000 metric tonnes of tuna worth approximately $830 million. Canned imports totaled 132,000 metric tonnes worth $314 million. Imports of fresh and frozen tuna were 184,000 metric tonnes worth $515 million, a decline of 9% in volume and 1% in value from the previous year. Most of this tuna is frozen tuna that is canned by tuna processors in the U.S. territories of Puerto Rico and American Samoa. U.S. frozen tuna imports can be expected to decrease sharply in future years, as H.J. Heinz, which operated a large tuna cannery in Puerto Rico, its cannery in late 2001.

Salmon is the third most important seafood imported by the U.S. As is the case with shrimp, U.S. salmon imports have increased rapidly over the past decade because of a large increase in increasingly inexpensive farmed product. In 2001, the U.S. imported 175,000 metric tonnes of salmon, worth $818 million, an increase of 20% in volume and 2% in value. Most of the increase in salmon imports in recent years has been in the form of fillets. In 2001, imports of salmon fillets increased 44% to 103,000 metric tonnes, while imports of whole salmon increased just 5% to 72,000 metric tonnes.

U.S. salmon imports are dominated by Chile and Canada. In 2000, Chile replaced Canada as the leading source of imported salmon. In 2001, Chile had a market share of 49%, followed by Canada, with 42%.

The U.S. is also a major market for groundfish fillets (cod, haddock, pollock etc.); however, imports have been steadily declining in recent years. In 2001, the U.S. imported 172,000 metric tonnes of groundfish, most of which were frozen fillets and blocks, worth $576 million, a decline of 19% in volume and 18% in value over the previous year.

Following the collapse of Canada's groundfish stocks in the early 1990s, China has emerged as the leading supplier of groundfish to the U.S. market. Almost all of the Chinese groundfish imports are twice-frozen blocks and fillets, most of which are processed from headed and gutted (H&G) fish caught in the Russian Far East. In

2001, China exported almost 70,000 metric tonnes of groundfish fillets to the U.S. worth $152 million, almost 80% of which was Alaska pollock.

Canada was the second leading supplier of groundfish in 2001 with exports of 42,000 metric tonnes worth $157 million. Approximately half of the Canadian groundfish exports were fresh fish. In 1991, Canada exported 130,000 metric tonnes of groundfish to the U.S.

Other important groundfish suppliers to the U.S. include Iceland, which had exports of 22,000 metric tonnes worth $128 million in 2001, and Norway, with exports of 9,000 metric tonnes worth $47 million.

U.S. edible seafood exports reached a record 1.13 million metric tonnes worth $3.1 billion in 2001. This was an increase of 20% in volume and 11% in value over 2000. Traditionally, Japan has been the leading market for U.S. seafood producers, although in recent years U.S. seafood exporters have diversified their markets. In 1996, for example, Japan accounted for almost 60% of the $2.9 billion worth of seafood exported by U.S. producers. In 2001, though, Japan accounting for just 35% of the $3.1 billion in seafood exports.

Of the new markets being developed by U.S. exporters, China is perhaps the most important one. In 1996, U.S. seafood exports to China were $78 million, however, by 2001, exports had grown to $127 million.

Groundfish and flatfish are the leading U.S. seafood exports. In 2001, U.S. exporters shipped 213,000 metric tonnes of whole groundfish and fillets worth $730 million to markets in Asia and the European Union (EU). In addition, the U.S. exported 181,000 metric tonnes of surimi worth $298 million.

Even though prices have declined considerably, salmon remains a valuable U.S. seafood export. In 2001, U.S. salmon exports totaled 152,000 metric tonnes worth $547 million. This is well below the level of 1995, when 205,000 metric tonnes worth $850 million were exported.

Fish roe is also a valuable U.S. export. In 2001, for example, U.S. seafood producers exported almost $550 million worth of fish roe. Roe from Alaska pollock ($350 million), salmon ($83 million) and sea urchin ($49 million) were the primary exports.

Other valuable U.S. seafood exports include lobster, which was worth $259 million in 2001, crab (king, snow and Dungeness), which was worth $78 million in 2001, squid at $72 million and sablefish, $55 million.

China Becomes a Major International Seafood Player

China is the fastest-growing international seafood trading country. China's improving living standards and its population's keen appetite for seafood have led to a sharp increase in imports, which reached $1.8 billion in value in 2000. In Shanghai, seafood consumption has surpassed that of red meat. Per capita seafood consumption in Shanghai, China's largest – and most affluent – city, has grown to almost 25 kilograms (live weight) a year, more than triple the country average.

It is also worth noting that a large volume of high-value seafood like live lobster and crab is smuggled into China to avoid high tariffs. These imports are obviously not recorded in the country's trade data. There is also a tendency to underreport the value of seafood imports into China in order to reduce tariffs.

The Chinese population spends a very high proportion of its disposable income on eating out and seafood is usually the featured meal at restaurants. Over the past decade, China has become a major importer of some very high-value seafoods such as live lobster, live crab, live geoduck clams and a number of types of shrimp. China has also become a growing market for farmed Atlantic salmon, which is normally eaten raw as sashimi[6].

China now also imports a number of lower-value seafoods, some of which are replacements for its own overfished resources. Among these species are ribbonfish, croaker, herring, squid and mackerel.

China's seafood imports would probably be significantly larger if it were not for high tariffs on imported seafood that is used for domestic consumption. As a condition for joining the World Trade Organization earlier this year, China agreed to lower tariffs to an average of less than 10 percent by the year 2004. This can be expected to lead to even stronger growth in imports, as the lower prices will expand the market for imported seafood.

China is also a major seafood exporter, second only to Thailand, as it has developed the world's largest secondary seafood processing industry, which is centred in the northeastern cities of Qingdao and Dalian. This industry developed after 1990, when Chinese processors began buying headed and gutted Alaska pollock caught by Russian fishing boats that were able to sell their catch on world markets following the collapse of the Soviet Union. The pollock was filleted by hand using low-cost Chinese labor and sold to markets in the U.S., Japan and Europe.

China's low labor costs have made it a leading reprocessing centre for a growing variety of seafood from around the world. Large quantities of groundfish from Norway, Russia and the U.S., for example, are exported to China, reprocessed and shipped to markets in Japan, the U.S. and the EU. Squid and shrimp are also imported from around the world and processed into value-added products for export.

More and more secondary seafood reprocessing will continue to be done in China, as labor costs and lack of an adequate labor pool is forcing developed countries like Japan and the U.S. to do their secondary seafood processing offshore. China is quickly becoming a major supplier of salted cod and pollock, for example. The growth in sales of more convenient, value-added seafood products is also leading to the expansion of China' seafood-processing industry.

The decline in catches of pollock and other groundfish from the Russian Far East over the past two years has motivated China's seafood processing industry to diversify the types of products it reprocesses. Significant quantities of Chilean sea bass, hoki, orange roughy, squid, salmon, herring, and shrimp are all now being imported, processed and re-exported to markets.

[6] Sashimi: raw fish meat sliced and eaten immediately.

In addition, China has become a leading exporter of higher-value aquaculture seafood such as shrimp, tilapia, sea bream and flatfish. In addition to low production costs, Chinese fish farmers have an advantage as they can sell a lot of their production live to domestic markets at a premium price.

In the past few years, China has accelerated its production of non-native, high value species. Large quantities of Pacific white shrimp, *Penaeus vannamei*, which is native to the west coast of Central and South America, are now being farmed in southern China. White shrimp, which China used to import from Ecuador, is considered by the Chinese to be much sweeter than black tiger shrimp, which is also farmed in China and imported from countries such as Vietnam, Thailand, India and Pakistan. Only a few years after the species was introduced, it is anticipated that China's harvest of Pacific white shrimp could reach 75,000 metric tonnes in 2002, exceeding the production of Ecuador, which has been farming shrimp since the late 1970s.

Chinese fish farmers have also started farming European turbot, *Psetta maxima*, which is sold live to restaurants in major cities such as Shanghai, Guangzhou and Hong Kong at prices that currently average about $12 a pound. Since turbot can be grown for about $6 a pound, a gold rush atmosphere has developed around this species, which is primarily farmed in Shandong Province in northeastern China. This species is now beginning to be exported in significant quantities to markets in Japan, the U.S. and Europe.

Other non-native species farmed in China and exported include abalone, North American red drum, Japanese snapper, freshwater eel, cobia, bass and grouper.

The competitive advantage of China's aquaculture industry and the concentrated effort by the Chinese government to encourage its development will lead to continued strong growth in this industry. Most Chinese fish farmers still use relatively primitive technology and only recently have some farms begun to use compound feeds and offshore cage systems. Chinese fish farmers can also be expected to be among the first to adapt the use of genetically modified strains of fish that they can grow faster and more cheaply. As China's aquaculture industry continues to develop it can be expected to export a large part of its production.

Thailand: Exports of Shrimp and Tuna Dominate Trade

In terms of value, Thailand is the world's largest seafood exporter. Thailand's total seafood trade, which amounted to about $5.1 billion in 2000, is dominated by exports of shrimp, tuna and squid. In 2000, Thai frozen shrimp exports totalled approximately $2.4 billion, while tuna exports totalled almost $850 million. Squid exports were approximately $270 million.

Thailand is the world's leading farmed shrimp producer with an annual production of between 250,000 and 300,000 metric tonnes, almost all of which is black tiger shrimp. Shrimp accounts for about 25 percent of the value of all Thai food exports and more than half of Thailand's shrimp exports go to the U.S.

Thailand exports large quantities of canned tuna to the U.S. (valued at $177 million in 2001) and frozen tuna loins to Europe, where they are canned by European canners.

Thailand imports about $800 million worth of seafood a year. Much of this seafood is raw material that is processed by Thai seafood processors and exported.

Imports by Big European Seafood Trading Nations Decline

The value of seafood imported by Spain, France and Italy, the three biggest seafood importing countries in Europe, declined 11% from 1998 to 2000 from $9.86 billion to $8.9 billion. (See Table 4)

Of these three countries, Spain is the largest seafood trading country with levels of imports in 2000 of $3.3 billion and exports of $1.6 billion. Spain imports a wide variety of seafood to meet the demands of its population, which, at almost 40 kilograms (live weight) has one of the highest per capita seafood consumption in the world.

Although the value of Spain's seafood imports has decreased, the volume has actually increased slightly from 1.2 million metric tonnes in 1998 to 1.25 million metric tonnes in 2000. Spain imports a wide variety of fish and shellfish including cephalopods[7], fresh and frozen fish and shrimp and lobster.

Over the long term, Spain's seafood imports can be expected to grow. Cutbacks by the EU and Morocco will continue to reduce catches by Spain's fishing fleet, the largest in Europe.

Spain is also a major seafood exporter, primarily to markets in Europe. Spanish seafood companies operate fishing boats and have processing plants in countries in Africa and South America. A significant amount of this production is sold to buyers in other EU countries.

After Spain, Denmark is Europe's second leading seafood trading country. Like Spain, Denmark is both a large seafood importer and a large seafood exporter. The difference, however, is that consumption in Denmark is small, as the country has a population of less than 6 million people.

Danish seafood trading companies are very active in many parts of the world and Denmark serves as a distribution centre for seafood from many parts of the world entering into the EU community. Large quantities of farmed salmon, for example, are imported from Norway and processed into smoked and other value-added products and exported duty-free into EU countries. Coldwater shrimp from the Faroe Islands and Canada is also imported into Denmark, peeled and exported to EU countries. According to a recent analysis, Denmark imports 70% of its seafood from non-EU countries and exports 89% of its manufactured seafood products to EU countries.

[7] Cephalopod: A mollusc of the class Cephalopa containing the squids, cuttlefishes, octopuses, nautiluses, ammonites, and related forms, all having around the front of the head a group of elongated muscular arms usually furnished with prehensile suckers or hooks.

France, the second largest seafood importer in Europe with imports of $2.9 billion in 2000, is one of the world's major markets for salmon, importing about 100,000 metric tonnes a year, more than 90% of which is farmed. France is considered a mature seafood market and total seafood supply is relatively static. The U.K., Norway and Denmark, all of which ship large quantities of farmed salmon to France, are the single largest suppliers of seafood. France imports seafood from a large number of countries, however, and none of the top suppliers such as the U.K. (11%) or Norway (9%) have a dominant market share. France is also a large importer of a wide variety seafood including shrimp, lobster, surimi, tuna and white fish fillets such as cod and Alaska pollock.

Although France is a net importer, French companies also export a significant amount of seafood, primarily to other European countries. In addition to a variety of value-added seafood products, French seafood trading companies import shrimp and lobster from a number of former colonies such as New Caledonia and Madagascar. France is also a large exporter of Chilean sea bass, which it catches in the Southern Indian Ocean off several remote island territories.

Norway is one of the world's leading seafood exporters, with annual exports of approximately U.S. $3.5 billion in 2000. Farmed salmon is Norway's leading export, accounting for about one third of the country's exports. Pelagic fish (herring, mackerel, capelin) make up the second most valuable category of exports, followed by saltfish and frozen white fish (cod, haddock, pollock) fillets.

Norwegian seafood exports have been relatively flat in recent years and actually declined slightly (2.4%) in value in 2001. This decline can be attributed to production limits placed on Norwegian farmed salmon production, which has now levelled off at about 450,000 metric tonnes. Because of pressure from EU farmed salmon producers such as the U.K. and Ireland, who have successfully argued that large increases in Norwegian salmon production have driven EU farmed salmon market prices below the cost of production, it is unlikely that Norwegian seafood exports will grow significantly in the near future. Over the longer term, however, Norwegian aquaculturists are expected to begin exporting halibut and cod, which could lead to growth in Norway's seafood exports.

Table 4. International Trade in Fishery Commodities[8]

IMPORTS U.S.$ Million				EXPORTS U.S.$ Million			
	1998	1999	2000		1998	1999	2000
Japan	$12,827	$14,749	$15,513	Thailand	$4,031	$4,110	$4,367
United States	8,579	9,407	10,453	China	2,656	2,960	3,606
Spain	3,546	3,287	3,352	Norway	3,661	3,765	3,533
France	3,505	3,281	2,984	United States	2,400	2,945	3,055
Italy	2,809	2,729	2,535	Canada	2,265	2,618	2,818
Germany	2,624	2,289	2,262	Denmark	2,898	2,884	2,756
UK	2,384	2,277	2,184	Chile	1,597	1,700	1,785
Hong Kong	1,612	1,594	1,949	Taiwan	1,580	1,702	1,756
Denmark	1,704	1,772	1,806	Spain	1,529	1,604	1,600
China	991	1,127	1,796	Indonesia	1,628	1,527	1,584

Source: FAO

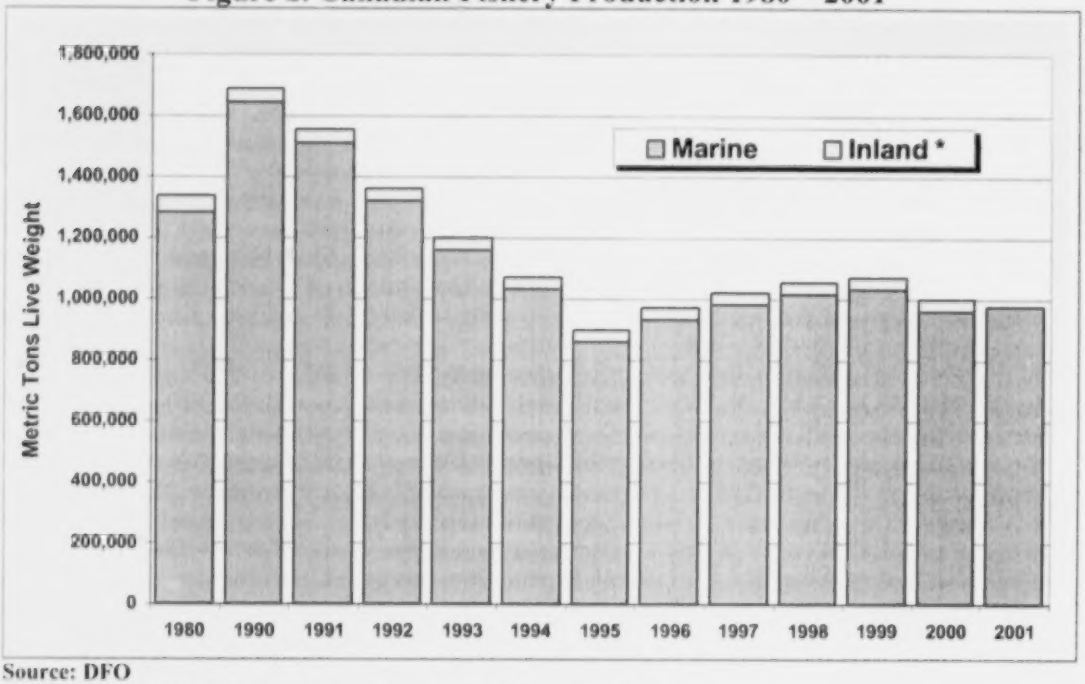
[8] Fishery Commodities, as defined by FAO, includes capture fisheries (including industrial fisheries) and aquaculture.

3. Current Canadian Seafood Production Situation and Outlook

A. Capture Fisheries

Since the early 1990s, Canada's fisheries landings (see Figure 2) have declined from more than 1.6 million metric tonnes to their current level of about 1 million metric tonnes.

Figure 2. Canadian Fishery Production 1980 – 2001



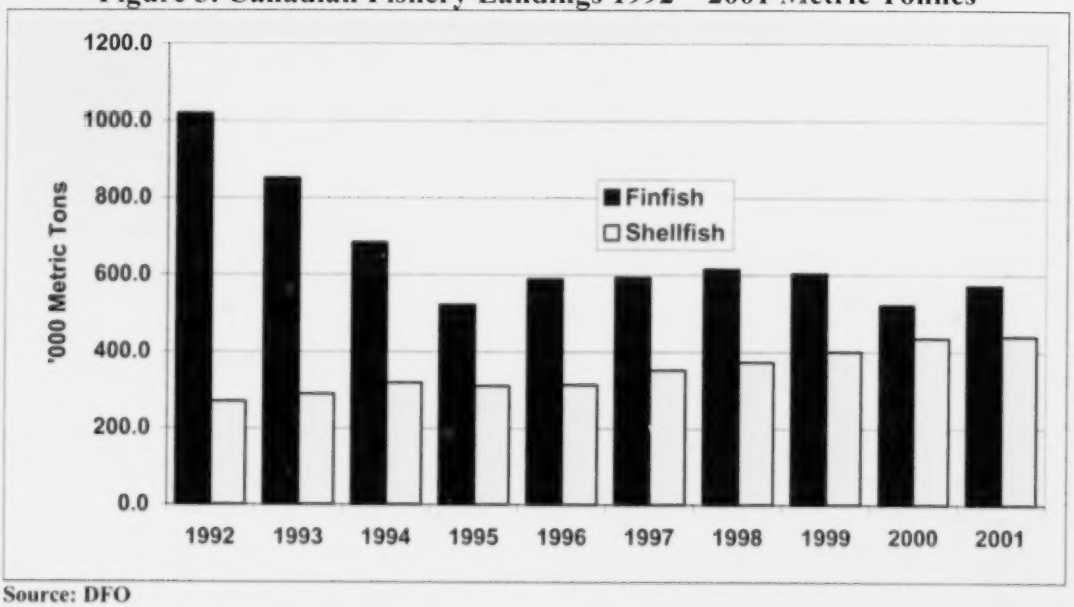
Source: DFO
* Data for Canadian inland fishery production for 2001 not available.

At the same time, Canada's finfish landings have declined, however, shellfish landings have steadily increased. (See Figure 3)

A major collapse of Atlantic groundfish stocks in the early 1990s has accounted for most of the decline of Canada's fisheries landings. (See Figure 4)

From a high of almost 650,000 metric tonnes in 1990, Canadian Atlantic groundfish landings declined to as low as 100,000 metric tonnes in 1995, before recovering to their current level of about 150,000 metric tonnes. Catches of cod, once the mainstay of the Canadian groundfish industry, plummeted from a high of 395,000 metric tonnes in 1990 to a low of just 12,500 metric tonnes by 1995, before recovering slightly to their current level of about 40,000 metric tonnes.

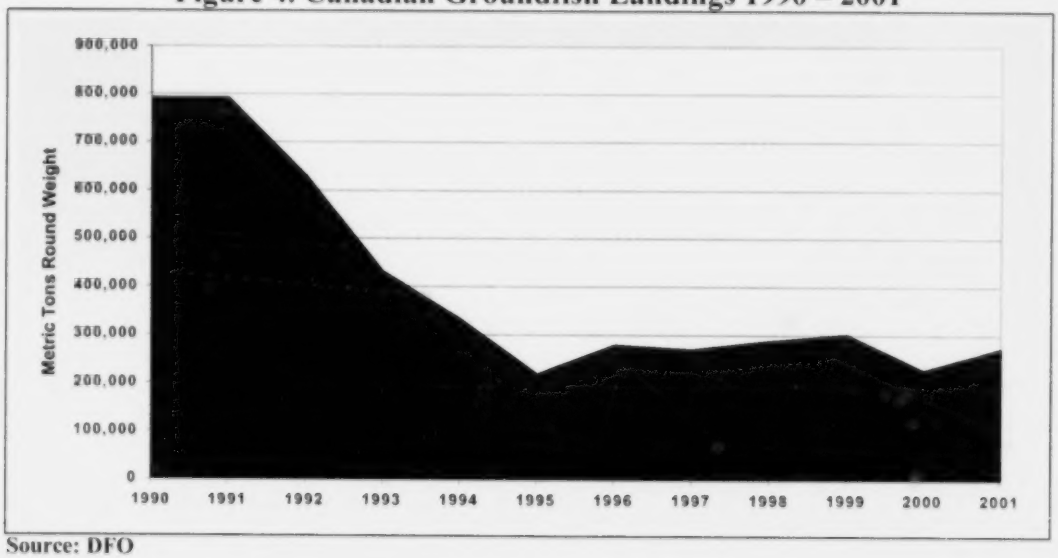
Figure 3. Canadian Fishery Landings 1992 – 2001 Metric Tonnes



Source: DFO

Groundfish landings from British Columbia have also declined in recent years, although the decline is less severe than in Atlantic Canada. From a high of 150,000 metric tonnes in 1999, B.C. groundfish landings dropped to just 78,000 metric tonnes due primarily to smaller landings from the Pacific hake fishery, which can account for two-thirds of the B.C. groundfish catch in a typical year.

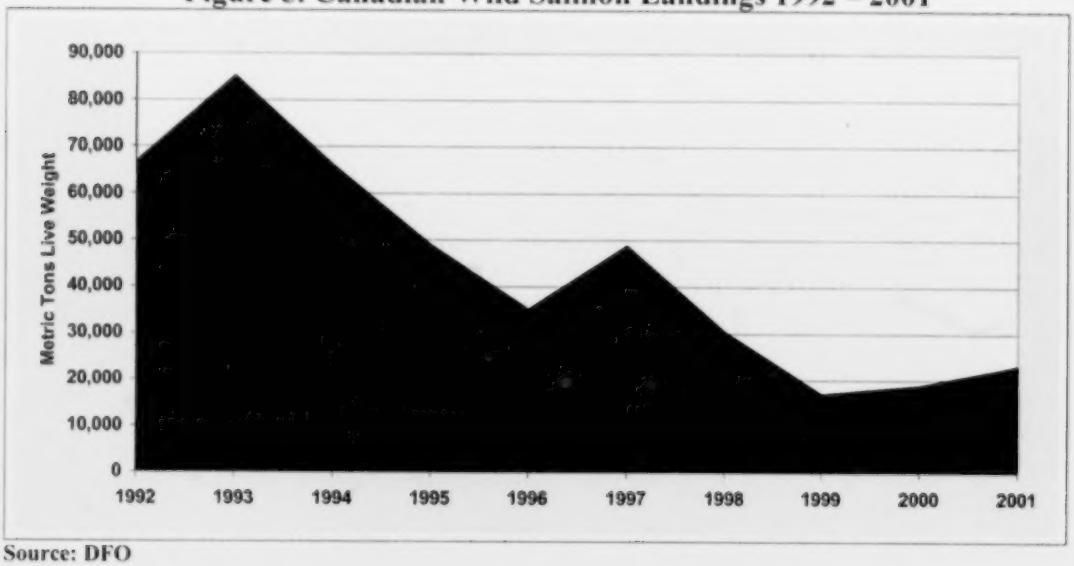
Figure 4. Canadian Groundfish Landings 1990 – 2001



Source: DFO

Canadian wild salmon landings (See Figure 5) have also fallen significantly over the past decade. After reaching a peak of 107,000 metric tonnes in 1985, B.C. catches plummeted to a low of just 16,900 metric tonnes in 1999, before rebounding somewhat to 22,000 metric tonnes in 2001. Most of the decline has been due to smaller sockeye catches, which have declined from 42,000 metric tonnes in 1993 to less than 8,500 metric tonnes since 1998.

Figure 5. Canadian Wild Salmon Landings 1992 – 2001



Source: DFO

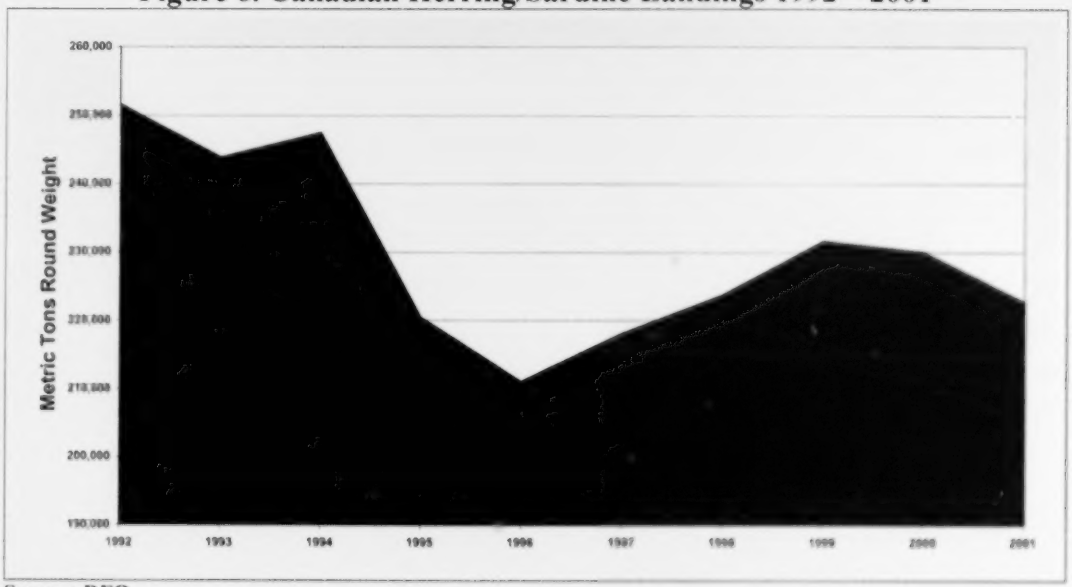
Landings of pelagic species such as herring, capelin and mackerel in Canada have declined as well. (See Figure 6) In 1990, Canadian pelagic landings were approximately 462,000 metric tonnes, including 301,000 metric tonnes of herring and 127,000 metric tonnes of capelin. By 1995, however, pelagic landings declined to just 259,000 metric tonnes, largely due to a complete collapse of the capelin fishery. A partial recovery of the capelin resource in recent years, however, has led to a modest rebound in Canadian pelagic landings to almost 280,000 metric tonnes in 2001.

Although Canadian finfish landings have declined substantially over the past decade, landings of higher-value shellfish have increased dramatically. While the increase in the volume of shellfish landings has not offset the decline in finfish landings, they have offset the decline in value.

In 1990, for example, fishermen in Canada landed 896 (Can $) million worth of finfish and 519 (Can $) worth of shellfish. In 2001, however, Canadian fishermen landed 425 (Can $) worth of finfish and 1.6 billion (Can $) worth of shellfish.

On a volume basis, Canadian shellfish landings have almost doubled from 251,000 metric tonnes in 1990 to 441,000 metric tonnes in 2001, while finfish landings have declined from 1.35 million metric tonnes to 573,000 metric tonnes.

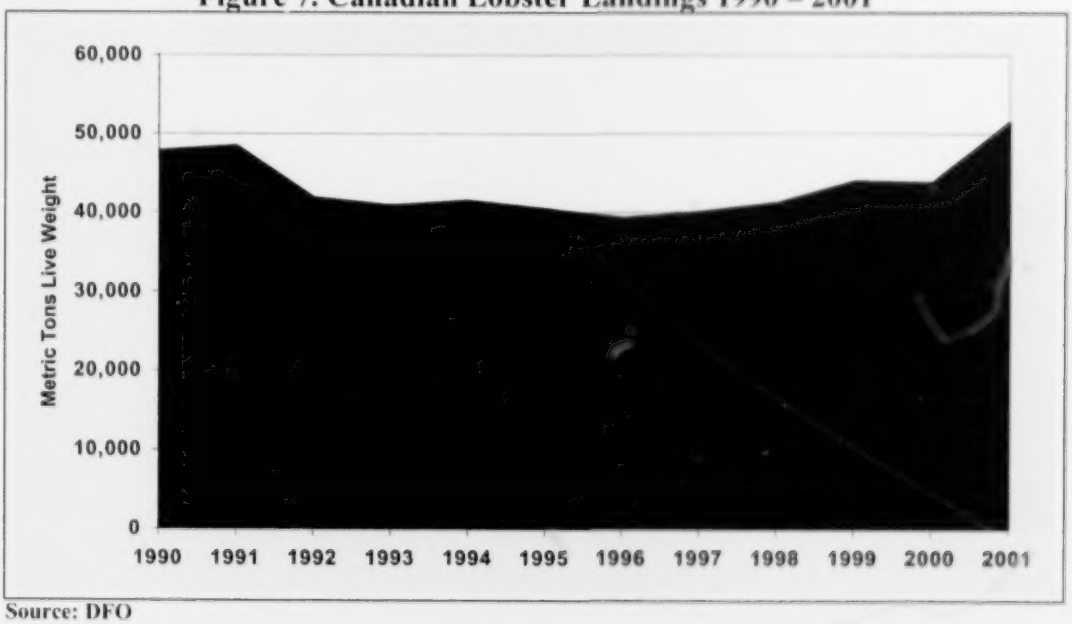
Figure 6. Canadian Herring/Sardine Landings 1992 – 2001



Source: DFO

On a value basis, lobster has accounted for the largest single increase in the value of Canadian seafood landings. Although the volume of Canada's lobster catch increased just 6% from 1990 to 2001 (See Figure 7), the value of the catch almost tripled, growing from 232 (Can $) million to 638 (Can $) million.

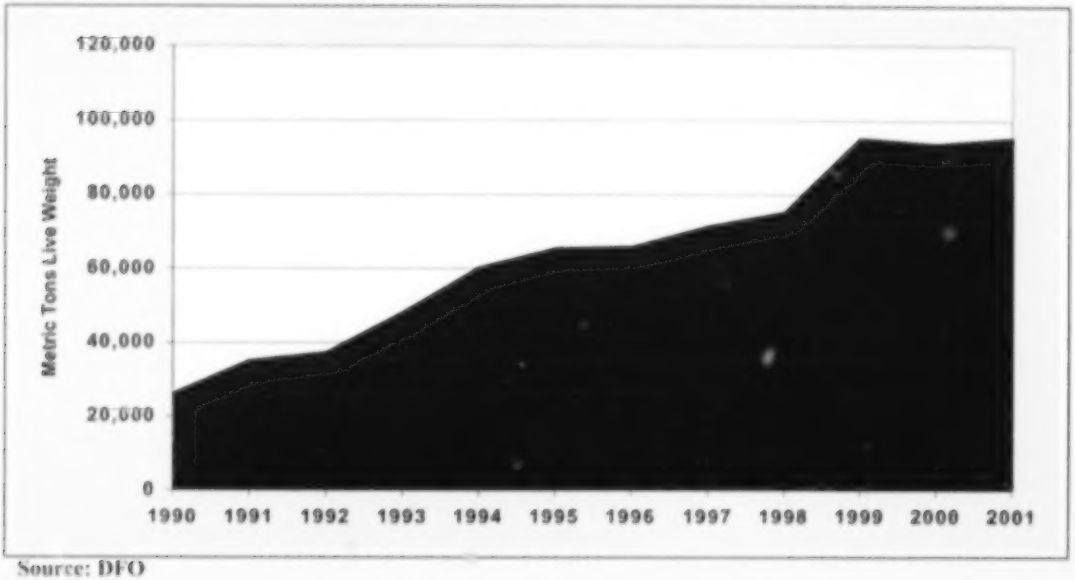
Figure 7. Canadian Lobster Landings 1990 – 2001



Source: DFO

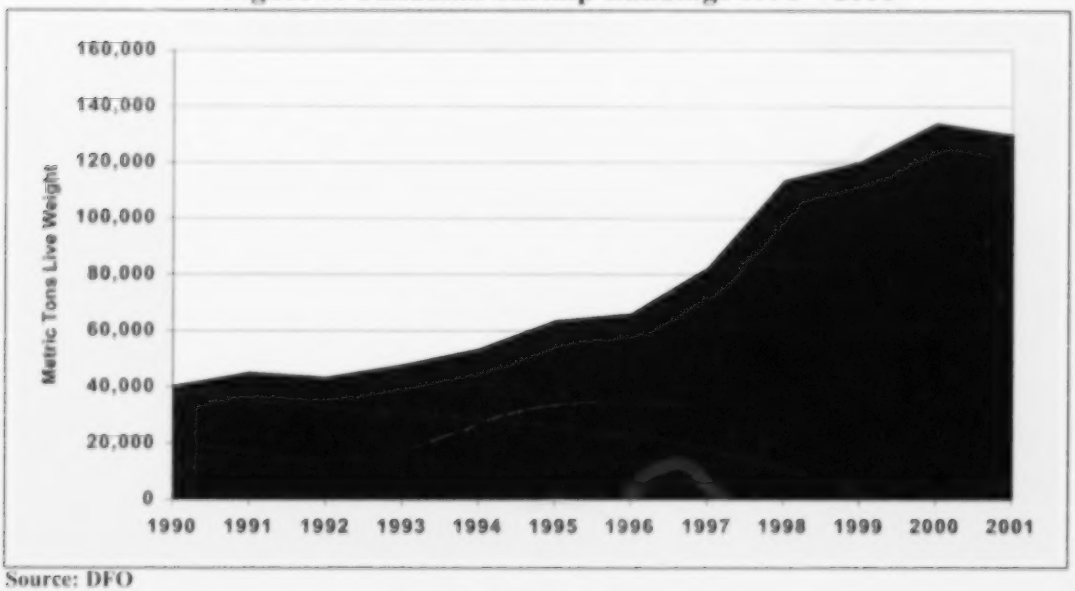
Both the volume and value of snow crab (Figure 8) and shrimp (Figure 9) landings, however, have increased sharply over the past decade. Landings of snow crab increased from 26,000 metric tonnes in 1990 to 95,000 metric tonnes in 2001, while the value of those landings increased from 49 million (Can $) to 396 million (Can $).

Figure 8. Canadian Snow/Queen Crab Landings 1990 – 2001



Source: DFO

Figure 9. Canadian Shrimp Landings 1990 – 2001



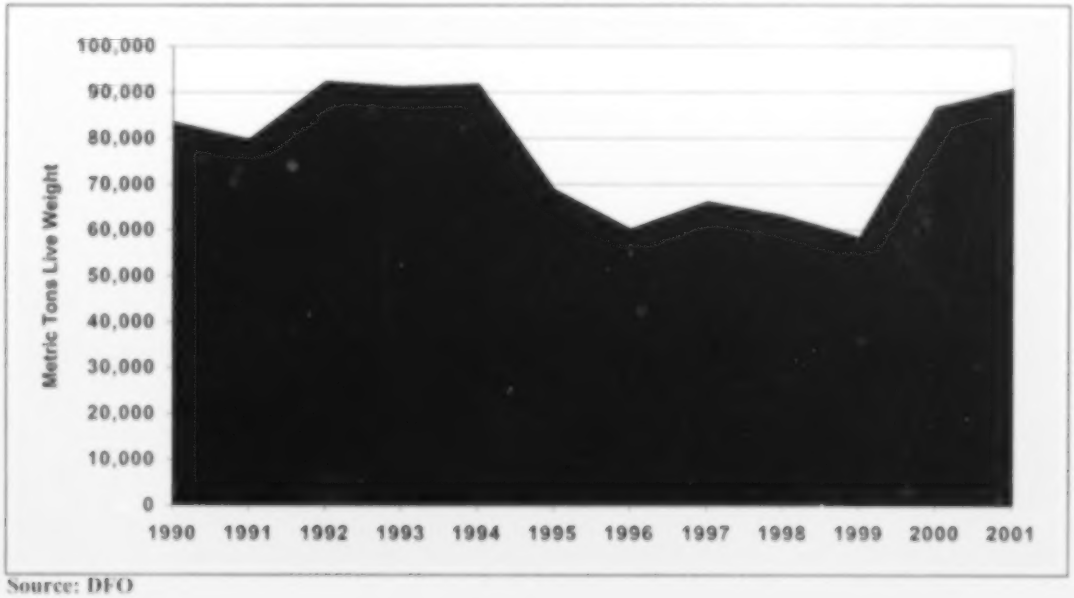
Source: DFO

Shrimp landings, almost all of which is northern pink shrimp (*Pandalus borealis*) from Atlantic Canada, increased from 40,000 metric tonnes in 1990 to 130,000 metric

tonnes in 2001, while the value increased 84 million (Can $) to 295 million (Can $). Shrimp landings in 2001 would have been higher if low ex-vessel prices caused by the increased production had not resulted in a fishermen's strike in Newfoundland.

The value of Canada's sea scallop fishery has increased almost 40% from 1990 to 2001, growing from 87 million (Can $) to 122 million (Can $), while the volume of landings (Figure 10) has grown 8%, from 83,000 metric tonnes (live weight) to 91,000 metric tonnes.

Figure 10. Canadian Scallop Landings 1990 – 2001



Source: DFO

Future Outlook:

It is unlikely that Canadian fisheries landings will increase significantly in the near future. Even after a 10-year moratorium, northern cod stocks have yet to show signs of recovering from their rapid collapse of the early 1990s. Although stocks of some other groundfish species have showed signs of recovery, it is likely that Canadian groundfish landings will remain in a range between 250,000 to 350,000 metric tonnes without the recovery of cod stocks.

The prospects for a complete recovery of Canada's wild salmon stocks are also not particularly bright over the near term future. Unfavourable environmental conditions are not expected to improve and while runs may well rebound from their current depressed levels of about 20,000 metric tonnes, they are unlikely to return soon to the 80,000 metric tonne levels of the mid 1990s.

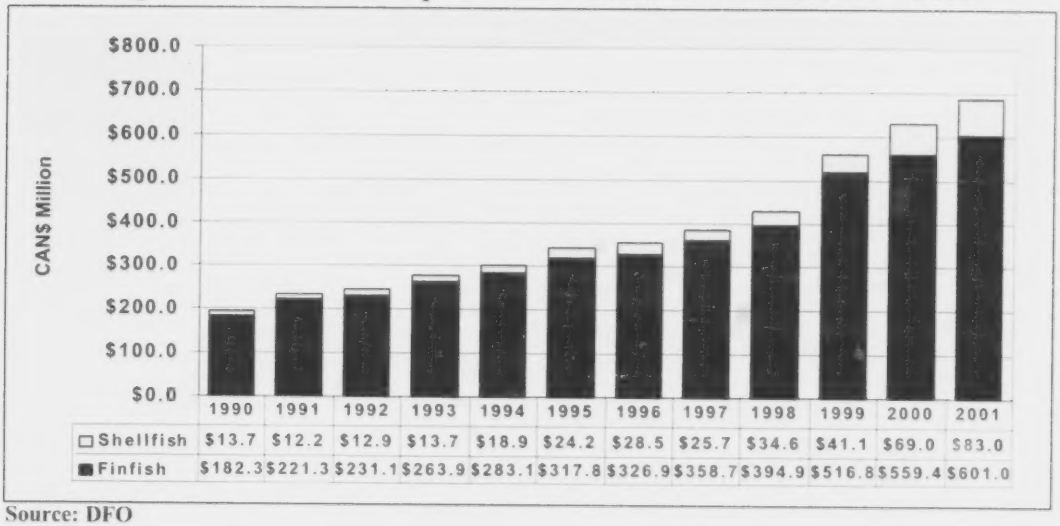
Landings of shellfish are also not likely to increase, although they should remain at or near their relatively high levels of the past few years over the near term. Longer term, any recovery of North Atlantic groundfish stocks could potentially lead to a decline in

landings of snow crab and shrimp. Biologists in Alaska believe that the sharp decline in snow crab landings (down from 350 million pounds live weight in 1992 to 27 million pounds in 2001) may be due, at least in part, to the increase in groundfish biomass.

B. Canadian Aquaculture Production Increasing

At the same time as the volume of Canada's fishery landings has declined, aquaculture production has steadily increased. (See Figure 11) Since 1990, Canadian aquaculture production (Figure 12) has grown from approximately 36,000 metric tonnes to 141,600 metric tonnes in 2001. Over the same period, the value of Canada's aquaculture production has increased from 195 million (Can $) to 684 million (Can $).

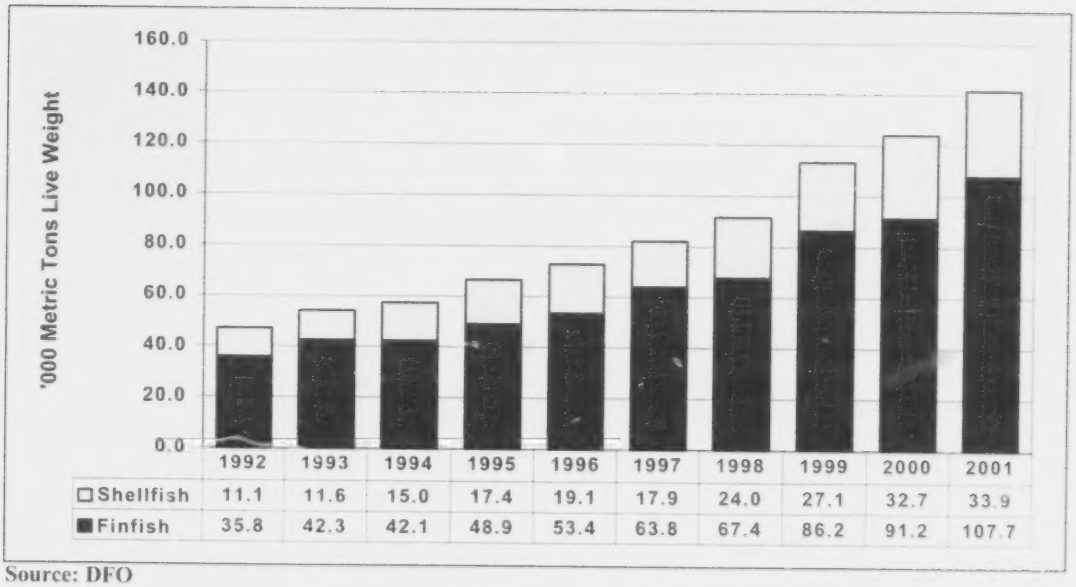
Figure 11. Canadian Aquaculture Production Value 1990 – 2001



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Shellfish	$13.7	$12.2	$12.9	$13.7	$18.9	$24.2	$28.5	$25.7	$34.6	$41.1	$69.0	$83.0
Finfish	$182.3	$221.3	$231.1	$263.9	$283.1	$317.8	$326.9	$358.7	$394.9	$516.8	$559.4	$601.0

Source: DFO

Figure 12. Canadian Aquaculture Production Volume 1990 – 2001



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Shellfish	11.1	11.6	15.0	17.4	19.1	17.9	24.0	27.1	32.7	33.9
Finfish	35.8	42.3	42.1	48.9	53.4	63.8	67.4	86.2	91.2	107.7

Source: DFO

From 1990 to 2001, the volume of Canada's total seafood production (wild and farmed) declined from 1.7 million metric tonnes to 1.2 million metric tonnes. Over the same period, the value (ex-vessel and ex-farm) of Canada's total seafood production increased from 1.6 billion (Can $) to $2.7 billion (Can $).

Salmon is by far the most important species raised by Canadian aquaculturists. According to estimates by the accounting firm PriceWaterhouseCoopers (PWC), farmed salmon accounted for 68% of the volume and 78% of the value of Canada's aquaculture industry in 2001.

Table 5. Canadian Aquaculture Production – Leading Species
Metric Tonnes Live Weight

	1996	1997	1998	1999	2000	2001
Salmon	45,624	56,775	58,618	72,890	78,495	94,872
Mussels	9,898	11,570	15,018	17,397	21,287	22,100
Oysters	7,989	5,631	8,137	8,785	10,024	9,200
Trout	6,592	5,910	5,962	6,581	6,407	6,400
Steelhead	1,097	946	2,354	6,002	5,523	N/A
Clams	979	649	704	800	1,000	1,800
Other Finfish[9]	50	117	402	595	694	N/A
Scallops	177	51	70	55	59	55
Other	28	20	47	41	359	N/A

Source: DFO; PriceWaterhouseCoopers (PWC)

From 2000 to 2001, Canada's farmed salmon production increased 21% to almost 95,000 metric tonnes, with most of the increase coming from farms in B.C., where production grew by almost 40% to 62,000 metric tonnes. Although the volume of the salmon harvest increased, the value of Canada's farmed salmon harvest declined due to depressed prices in world markets as a result of a rapid increase in production. Atlantic salmon accounts for more than 90% of Canada's farmed salmon production.

Trout, which is also marketed as steelhead when grown to a larger size, is the other major finfish species raised by Canadian fish farmers. In 2000, Canadian fish farmers produced approximately 12,000 metric tonnes of trout and steelhead.

Fish farmers in Canada raise less than 1,000 metric tonnes of Arctic char. Although Arctic char is often mentioned as an ideal candidate for aquaculture, production remains very limited due to high production costs.

Canadian aquaculturists also produce growing harvests of shellfish. According to the PWC survey, Canadian shellfish farmers produced 33,900 metric tonnes of shellfish in 2001, an increase of 20% over the previous year.

In terms of volume and value, the blue mussel is the most important shellfish species grown in Canada. In 2001, Canadian mussel farmers produced about 22,000 metric tonnes of mussels, a slight increase from 2000. With production from P.E.I maximized due to a lack of additional new sites, most of the growth in Canadian mussel production is in Newfoundland, where production was up by 38% in 2001. From 1990 to 2000, the ex-farm value of Canada's mussel harvest grew from 4 million (Can $) to 27 million (Can $).

[9] Mostly Arctic Char

According to PWC, production of farmed oysters in Canada, most of which are grown in B.C., increased sharply in 2001, rising 17% to 9,200 metric tonnes (live weight). Some confusion exists over this data, however, as DFO aquaculture production data for 2000 shows oyster production of 10,200 metric tonnes, which includes 2,731 metric tonnes of oysters from PEI.

The size of the harvest of clams (including quahogs, bar clams, Manila clams, etc.) produced by Canadian aquaculturists is also increasing. According to PWC, farmed clam harvests reached 1,800 metric tonnes in 2001, an increase of 38% over the previous year. DFO aquaculture data, however, estimates Canada's 2000 clam harvest as 1,000 metric tonnes.

Future Outlook:

Canada's aquaculture industry has significant opportunity for growth both in terms of currently cultured species, but also for new finfish species such as sablefish (black cod), halibut and wolffish and shellfish species such as geoduck and Manila clams and Mediterranean mussels. Canada has vast unpopulated coastal areas and abundant clean water resources that could be utilized for any expansion effort. The Canadian government, both at the national and provincial levels, generally encourages aquaculture development.

Demand from the U.S. for high-quality fresh seafood will continue to fuel growth in Canada's aquaculture production and Canada is in an ideal position to meet this demand, unlike U.S. aquaculture producers.

The United States has limited coastal aquaculture development due to legislative and regulatory barriers. Alaska, for example, forbids finfish culture and some other states have imposed on the aquaculture industry excessive permitting requirements for site development and water usage. In most states, the considerable expense of a protracted permitting process has discouraged growth in coastal aquaculture. And when permits are granted by regulatory agencies, local opposition from adjacent landowners can lead to costly court battles that may prevent permits from being used.

In the near future, growth in Canada's aquaculture production will come from existing species, especially salmon in B.C., where a moratorium on new salmon farming permits was lifted in 2002. However, the growth in salmon production will be hampered by current low salmon prices, which have been below most producers' cost of production for most of 2001 and early 2002. In addition, opposition from environmental groups and Aboriginals in B.C. may continue to slow expansion in B.C. despite the lifting of the moratorium.

Nevertheless, several of the largest salmon-farming companies in the world, including Pan Fish ASA, Stolt Sea Farms and Nutreco's Marine Harvest unit, are committed to increasing their production in Canada to meet the growing demand for fresh salmon in the U.S., where salmon is now the third most widely consumed seafood.

Shellfish production can also be expected to increase significantly. Taylor Shellfish Co., the largest shellfish farming company in Washington State, plans to expand its production of Mediterranean mussels in B.C., where growing conditions are ideal.

Taylor currently grows about 750 metric tonnes of Mediterranean mussels in southern Puget Sound, but the company is unable to meet increasing demand, as it cannot acquire additional permits.

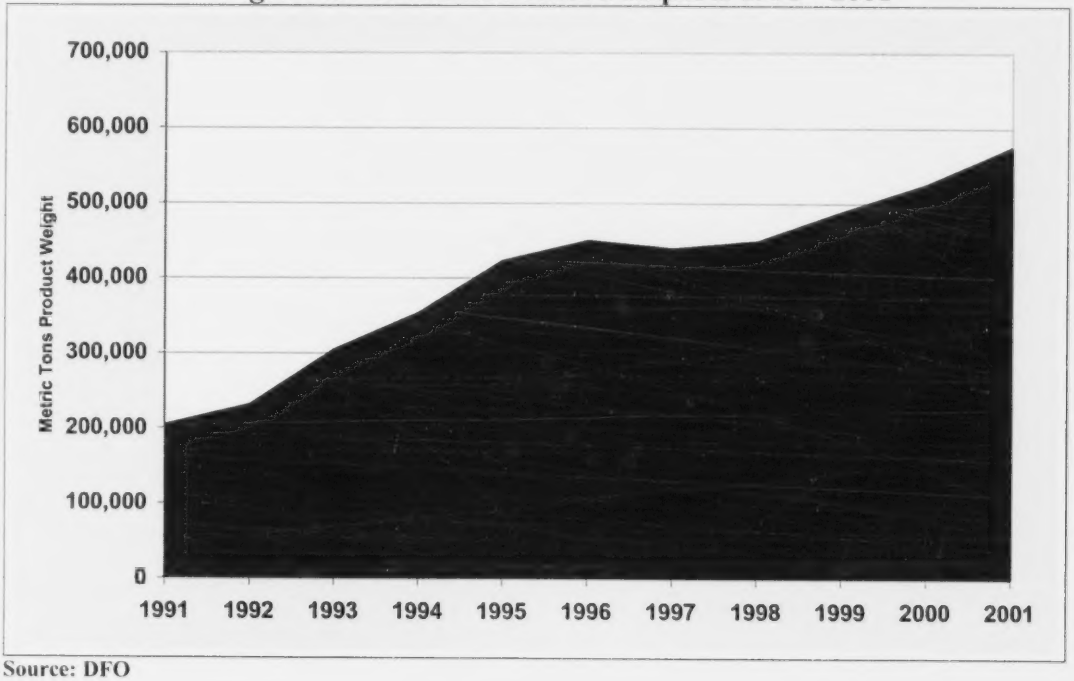
Shellfish farmers in B.C. can also be expected to become significant producers of both Manila and geoduck clams. Farming of both these species is highly profitable and B.C. has ideal growout conditions.

4. Canada's International Seafood Trade:

A. Imports Keep Rising

There has been an upward trend in Canadian seafood imports over the past decade (see Figure 13). They have increased from 204,000 metric tonnes in 1991 to 574,000 metric tonnes in 2001. The value of Canada's seafood imports has grown from 782 million (Can $) to 2.17 billion (Can $) over the same period.

Figure 13. Canadian Seafood Imports 1991 - 2001

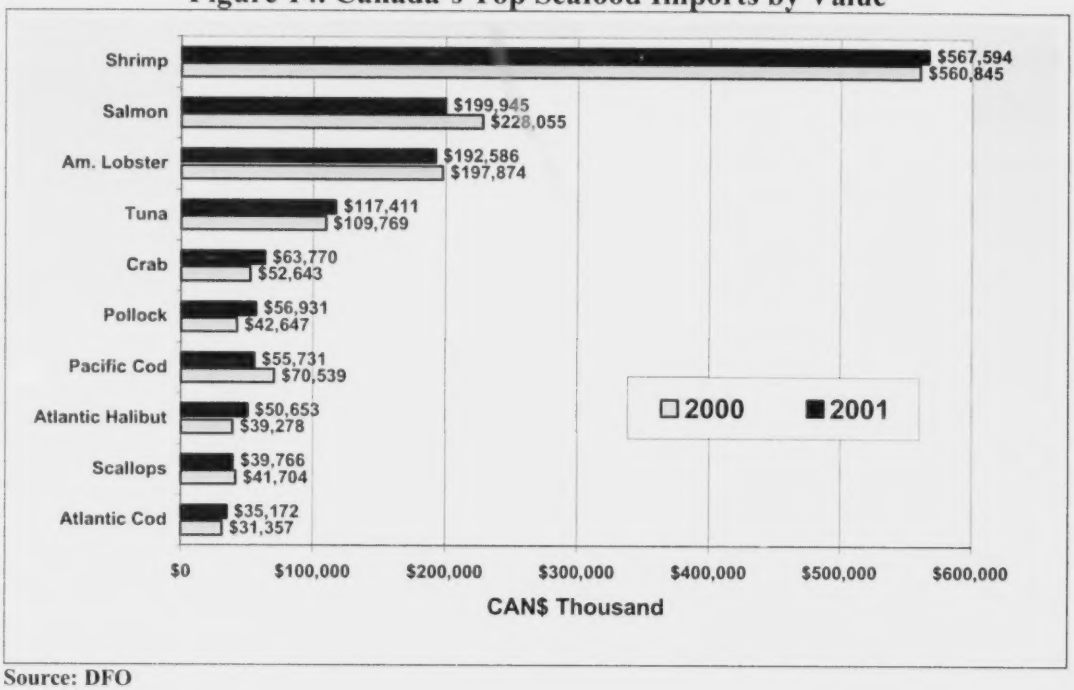


Source: DFO

A significant percentage of Canada's imported seafood is processed and re-exported. As Canada's groundfish landings have declined, for example, processors in the Maritimes and Newfoundland have imported headed and gutted cod, pollock and haddock from countries like Norway and Russia. This fish is then filleted and re-exported to markets in the U.S. In 2001, for example, Canada exported approximately 24,000 metric tonnes of cod, most of which was in the form of fillets, even though Canada's total cod landings (round weight) were 40,000 metric tonnes and a significant percentage of the Canadian catch was sold domestically as fresh fish.

Wild Pacific salmon is another example of Canadian processors' importing raw material, in this case from Alaska, to make up for shortages of domestic production. In 2001, Canadian processors exported approximately 20,000 metric tonnes of Pacific salmon, much of which was canned, although the catch was 23,000 metric tonnes, a significant portion of which was consumed domestically.

Figure 14. Canada's Top Seafood Imports by Value



Source: DFO

As is the case in the U.S., shrimp is the most valuable seafood imported by Canada. (Figure 14) In 2001, Canada imported 73,500 metric tonnes of shrimp worth 568 million (Can $), an increase of 11% in volume and 1% in value. Record low shrimp prices, which are the result of large increases in farmed production from Asia, have led to record shrimp consumption in a number of countries, including the U.S. and Canada.

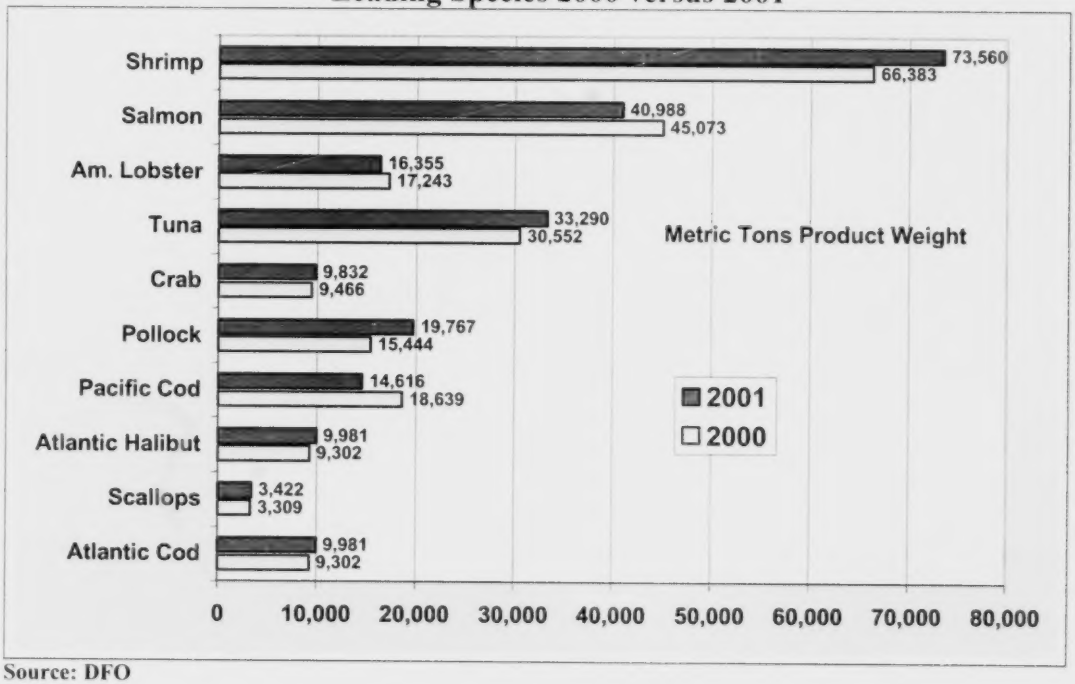
Salmon is Canada's second most important imported seafood, however, as mentioned previously, a large percentage is wild salmon from Alaska and Washington State that is exported, primarily to markets for canned products in Europe. In addition, Canada imported approximately 8,300 metric tonnes of Atlantic salmon from Maine and Washington, most of which was processed and re-exported back to the U.S. Since 1993, when Canadian catches started to decline, imports of wild Pacific salmon have more than doubled. In 2001, Canada imported about 41,000 metric tonnes of salmon worth 200 million (Can $), a decrease of about 10% in volume from the previous year. Most of the decrease in salmon imports was in pink and chum salmon, as Canadian catches rebounded from 2000.

Tuna, most of which is canned skipjack, is another valuable Canadian seafood import. In 2001, tuna imports were about 33,300 metric tonnes worth 116 million (Can $), an increase of 9% in volume and 14% in value over 2000. Canada also imported a significant quantity of oysters in 2001, amounting 27,685 tonnes worth 20 million (Can $), mostly from the U.S.

Canada is also a large importer of groundfish. In 2001, for example, Canada imported almost 25,000 metric tonnes of cod (Atlantic and Pacific), almost 20,000 metric tonnes of pollock and almost 8,000 metric tonnes of haddock. The value of these imports was about 183 million (Can $). As discussed previously, a significant percentage is processed and exported to markets in the U.S. Imports of groundfish continue to increase, although at a more moderate rate. From 2000 to 2001, for example, Canada's imports of cod, haddock and pollock increased 8%.

Lobster is another valuable Canadian import, although once again a large percentage is imported, in this case mostly from Maine, and then exported. In 2001, Canada imported 16,355 metric tonnes of lobster (Figure 15), more than 90% of which was live American lobster from the U.S. The value was 193 million (Can $).

Figure 15. Canadian Seafood Imports by Volume: Leading Species 2000 versus 2001



Source: DFO

In addition to being its largest export market, the United States is far and away Canada's most important seafood supplier, sending 226,000 metric tonnes of product in 2001 worth 936 million (Can $). This compares with year 2000 figures of 207,000 metric tonnes and 912 million (Can $). On a volume basis, the U.S. accounts for almost 40% of Canada's seafood imports and 43% of their value. Lobster is the most valuable U.S. export to Canada at about 190 million (Can $), followed by salmon at about 175 million (Can $). Other valuable U.S. exports to Canada include halibut at about 75 million (Can $), shrimp at 57 million (Can $) and groundfish at 51 million (Can $).

Other important seafood suppliers to Canada include Thailand, which exported 45,000 metric tonnes of seafood worth 314 million (Can $) in 2001. Most of the Thai exports consists of black tiger shrimp. China is also an increasingly important supplier to Canada. In 2001, Canada imported 23,000 metric tonnes of seafood from China worth 112 million (Can $). Chinese exports include groundfish and shrimp. Peru is a large fisheries products exporter to Canada; however, most of the exports consist of fish meal.

Future Outlook:

Canada's seafood imports are likely to keep increasing, although only moderately in the near future. Most of the future increases will probably be in seafoods such as warmwater shrimp, which Canada does not produce. It is not expected that Canada will increase, much beyond current levels, the volume of seafood that it imports and then exports.

In the case of groundfish, for example, Canadian processing and labor costs are too high, relative to comparable costs in China. More and more groundfish from countries like Russia, Norway and the U.S. is being exported to China for further processing. After concentrating on frozen groundfish fillets, Chinese processors have now begun producing salted groundfish, which will reduce the amount of raw material imported by Canadian salters.

B. Export Value Sets a Record

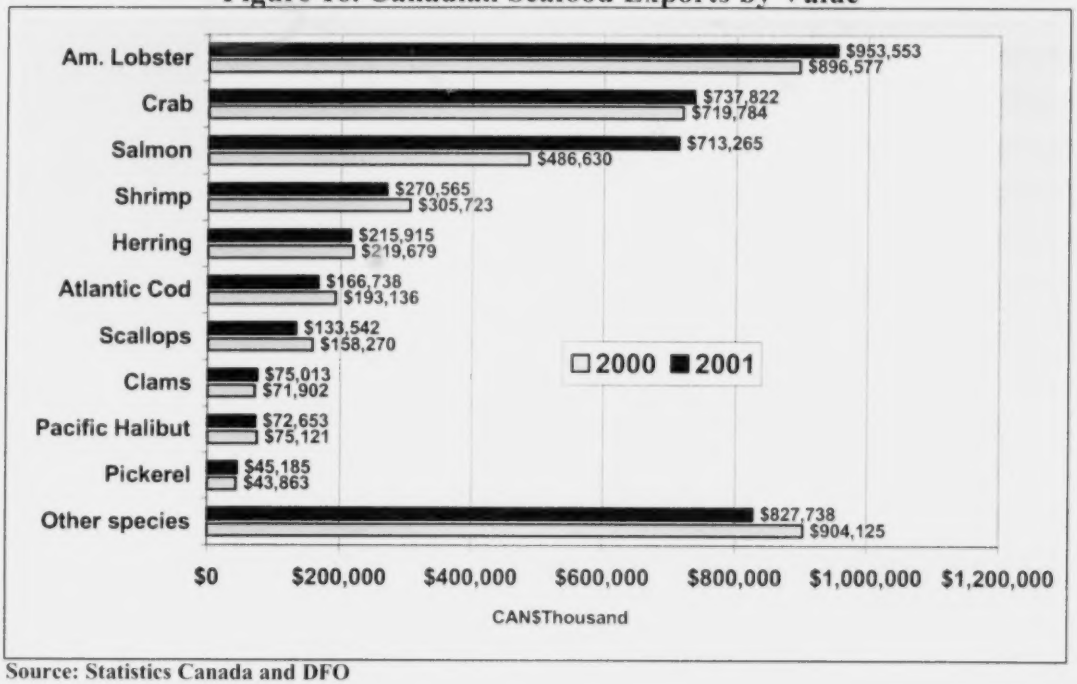
Driven in large measure by increases in snow crab and shrimp landings as well as in production of cultured salmon, Canadian seafood exports increased by over 50,000 metric tons to about 548,000 metric tons in 2001 versus 2000. The value of Canada's seafood exports increased 3% to about 4.2 billion (Can $). (Figure 16)

With an export value in 2001 of 954 million (Can $), lobster is Canada's most valuable seafood export, followed by salmon at about 738 million (Can $), snow crab at 573 million[10] (Can $) and shrimp at 270 million (Can $).

The volume of Canada's seafood exports in 2001 were the highest since 1991, prior to the collapse of Canada's groundfish stocks. The value of Canada's seafood exports in 2001, however, set a record, and were almost double the 2.4 billion (Can $) exported in 1991.

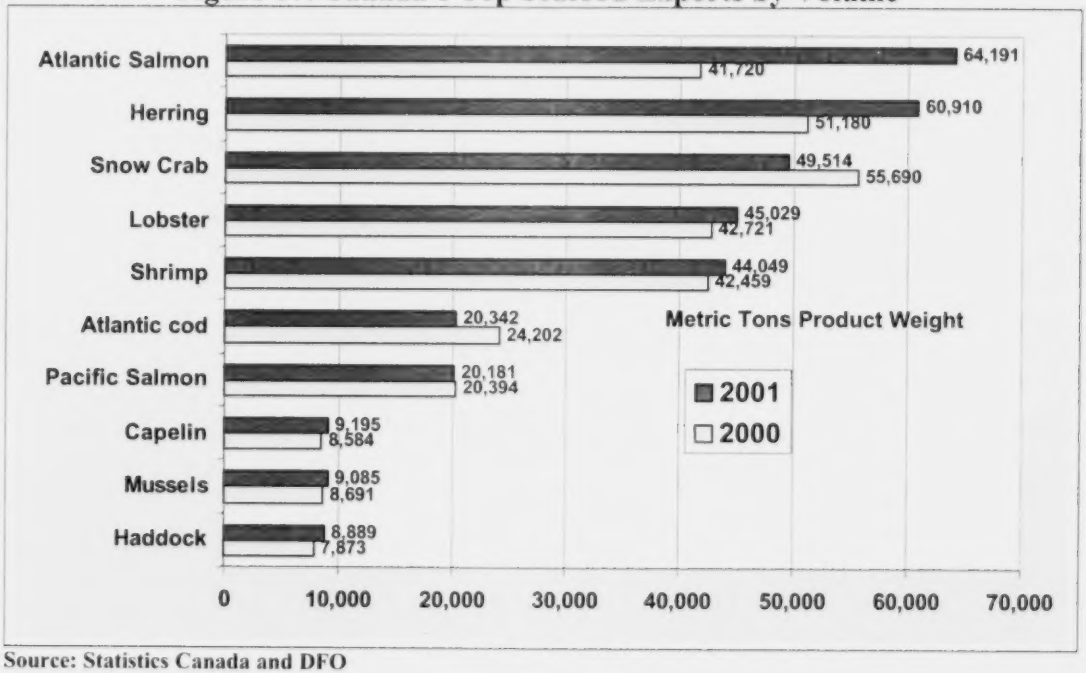
[10] DFO export statistics for 2000 do not identify species of crab. Thus all crab exports in 2000 were valued at 719.8 (Can $) million while snow crab exports in 2001 totaled 573.2 million(Can $) and all crab exports 734.6 million (Can $).

Figure 16. Canadian Seafood Exports by Value



Source: Statistics Canada and DFO

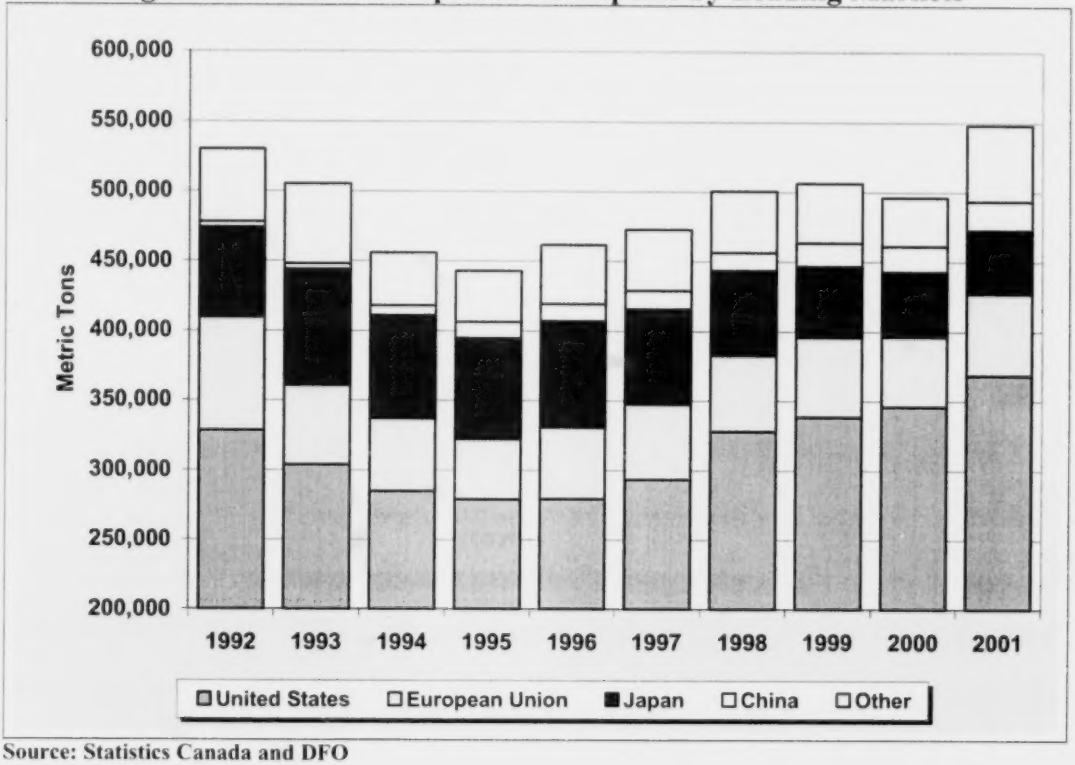
Figure 17. Canada's Top Seafood Exports by Volume



Source: Statistics Canada and DFO

By volume, farmed Atlantic salmon was Canada's leading export at about 64,000 metric tonnes in 2001, followed by herring at about 61,000 metric tonnes, snow crab at 49,500 metric tonnes, lobster at 45,000 metric tonnes and shrimp at 44,000 metric tonnes. Since 1991, Canadian exports of Atlantic cod have fallen from 99,000 metric tonnes to just 20,000 metric tonnes (figure 17).

Figure 18. Canada's Top Seafood Exports by Leading Markets



Source: Statistics Canada and DFO

Although the U.S. has always been Canada's largest market, Canadian seafood exporters are more reliant on the U.S. (See Figure 18)

In 2001, the U.S. accounted for 67% of the volume (368,554 metric tonnes) and 73% of the value of all of Canada's seafood exports. In 1995, however, the U.S. accounted for 62% of the volume and 51% of the value of Canadian seafood exports.

Lobster is Canada's most valuable export to the U.S. In 2001, the U.S. imported about 34,500 metric tonnes of lobster from Canada, which was worth about $520 million. U.S. imports of Canadian lobster increased sharply in the late 1990s, from their typical level of about 20,000 metric tonnes a year. This sharp increase in imports from Canada corresponds to a sharp increase in U.S. lobster exports to Canada, indicating much of the product was imported and then re-exported by Canadian suppliers.

Farmed Atlantic salmon is Canada's second most valuable export to the U.S., which buys 96% of Canada's Atlantic salmon exports. In 2001, the U.S. imported 62,600 metric tonnes of farmed Atlantic salmon worth $349 million. This represents an increase of 29% in volume and 23% in value over the previous year.

The increase in the value of Canada's Atlantic salmon at a time when salmon prices are depressed is due to a rapid increase in the exports of fresh fillets. In 2001, Canadian fish farmers exported approximately 13,000 metric tonnes of fresh fillets, more than double the amount exported the previous year. As a result, the average value of Canada's farmed Atlantic salmon exports declined only slightly, from $5.85/kilo in 2000 to $5.58/kilo in 2001.

Snow crab is Canada's third most important export to the U.S. From 1991 to 2001, the volume of Canada's snow crab exports to the U.S. increased from just 1,600 metric tonnes to almost 37,000 metric tonnes, while the value increased from $17.6 million to $275.6 million.

The volume and value of Canada's groundfish exports to the U.S. has declined sharply since 1991, when Canadian processors exported 130,700 metric tonnes of groundfish worth $450.6 million. In 2001, Canada's groundfish exports to the U.S. were just 42,400 metric tonnes worth $157 million.

Over the same period, Canada's flatfish exports to the U.S. have held up better. In 1991, Canadian processors exported 25,600 metric tonnes of flatfish worth $115.6 million. In 2001, flatfish exports were 18,200 metric tonnes worth $93 million. Fresh Pacific halibut is Canada's most valuable flatfish export to the U.S. In 2001, U.S. importers purchased 5,700 metric tons of fresh Pacific halibut worth almost $40 million. The U.S. bought approximately 84% of Canada's Pacific halibut exports in 2001.

As Canada's landings of *Pandalus borealis* have increased sharply, shrimp has become an important export to the U.S. In 2001, Canada exported about 6,700 metric tonnes of shrimp, mostly cooked and peeled meats, worth $40.7 million

Although Japan has long been Canada's second most important seafood export market, exports to Japan have dropped sharply, due largely to a decline in sockeye salmon exports. From 1995 to 2001, the volume of Canadian seafood exported to Japan has dropped from 76,200 metric tonnes to 45,300 metric tonnes, a decline of 40%, while the value has declined from $771 million (Can $) to 418 million (Can $), a decline of 46%.

While sockeye exports to Japan have dropped, Canadian exports of snow crab have also declined recently, despite a very large decline in Alaska snow crab landings. According to Statistics Canada, the value of Canada's crab exports to Japan, almost all of which is snow crab, declined from 166 million (Can $) in 2000 to just 90.5 million (Can $) in 2001. This drop can largely be attributed to large supplies of inexpensive fresh king crab from Russia in 2001, which are preferred to snow crab.

Japan remains the only market for herring roe (kazunoko), however, the value of Canada's kazunoko *exports* could decline further as it is anticipated that the long-term demand for salted roe products will decline in Japan.

In contrast to Japan, Canadian exports to China have been growing and in 2001, China became Canada's third most important export market for seafood, as Canadian exporters exported 17,500 metric tonnes of seafood worth 111.5 million (Can $). Since 1995, exports to China have grown steadily from 4,500 metric tonnes worth 56 million (Can $). Canada's most valuable seafood exports to China include live Dungeness crab and geoduck clams, frozen surf clam meat and whole frozen coldwater shrimp.

Canadian exports to the EU have declined over the past 10 years from a level of about 80,000 metric tonnes a year to their current level of between 50,000 and 60,000 metric tonnes a year. A decline in groundfish and salmon exports has been partially offset by increased exports of shrimp and lobster.

On a volume basis, Denmark, which imports whole Canadian shrimp for peeling, is Canada's largest single market in the EU, followed by Germany, the U.K. and France. On a value basis, the U.K., which imports large volumes of canned salmon, is the largest single market, followed by Denmark, France (a major market for live lobsters) and Germany.

Future Outlook:

Most of the growth in Canadian seafood exports will continue to come from exports to the U.S. This is due to the facts that in all likelihood future increases in Canadian seafood production will be from aquaculture seafood production and more than 90% of Canada's aquaculture seafood exports are to the U.S. market.

Canadian seafood exports to Japan could rebound somewhat from their current low levels for several reasons. The first would be if sockeye harvests increase from their current historical lows. Second, Japan's imports of snow crab from Canada are likely to increase following a rapid decline in Russian king crab harvests in 2002 due to severe overfishing. Finally, if Canadian aquaculture producers can successfully farm sablefish, Japan would be the most obvious export market for Canada.

While Canada's seafood exports to China will likely continue to grow, the rate of growth will probably slow down in future years, although China will remain an increasingly important seafood trading partner with Canada. Following its formal entry into the World Trade Organization (WTO) this year, China is obligated to reduce seafood tariffs to 10% or less by 2004. This is expected to sharply increase demand as imported seafood becomes more affordable.

One of Canada's most valuable seafood exports to China, live Dungeness crab, is often purchased from U.S. buyers and exported to China through Vancouver, often by exporters of Chinese or Taiwanese descent. Since 1995, U.S. exports of live Dungeness crab to Canada have increased from 2,000 to almost 6,000 metric tonnes. It is possible that U.S. seafood exporters may eventually wake up and realize they can export their product directly to China. As the U.S. Dungeness harvest is about four times the size of the B.C. harvest, B.C. exporters could lose market share, although the overall market should continue to grow.

Live geoduck clams are another valuable Canadian export to China. U.S. shellfish farmers are beginning to harvest significant quantities of geoducks, which could lead to a decline in the value of Canadian geoduck exports unless Canadian shellfish farmers can successfully farm large quantities of geoducks.

On the other hand, Canadian exports of live lobster, surf clam and whole shrimp to China are all likely to continue to increase in the near future.

Canada's seafood exports to Europe are not expected to change much from their current level. Growth in seafood consumption is flat and the markets in most countries for Canadian seafood products is mature.

5. Total Canadian Seafood Supply

The total domestic Canadian seafood supply (landings, aquaculture production and imports minus exports) has stayed within a relatively narrow range over the past decade of approximately 1,150,000 metric tonnes.

Figure 19. Canadian Seafood Supply 1991 - 2001

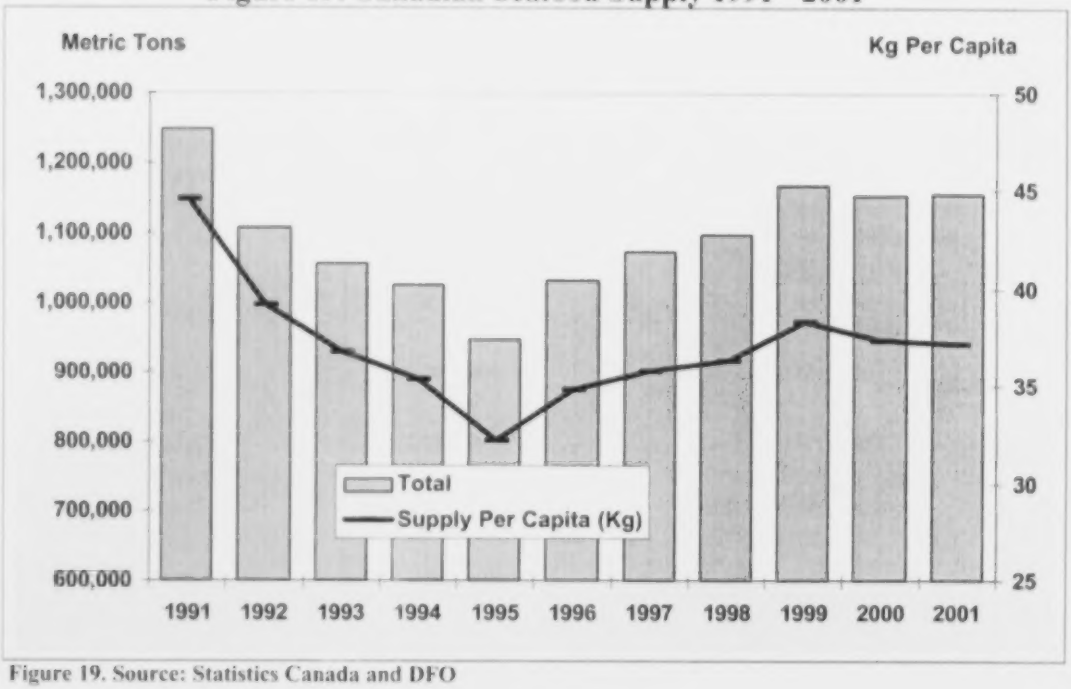


Figure 19. Source: Statistics Canada and DFO

Canadian Supply Outlook and Forecast

Although Canadian fishery production is no longer declining, it is also not increasing. Thus, any future growth in the Canadian seafood supply will have to come from imports and/or aquaculture. Globally the picture is much the same. As the FAO has pointed out time and again, no increases in capture fisheries can be expected and aquaculture will have to fill any growth in demand.

As per Table 6, Canada's seafood supply for 2000 is estimated to have been approximately 1,053,000 metric tonnes (live weight equivalent). This corresponds to a per capita supply of 36.7 kg (based upon a population of 31.1 million). Simply as a result of increases in the population as forecast by Statistics Canada, the following quantities would be required to maintain current per capita supply:

Table 6. CANADIAN SEAFOOD DEMAND FORECAST		
Year	Population - Million	Supply at 36.7 Kg Per Capita (Metric Tonnes)
2000	31.1	1,053,780
2011	33.4	1,225,780
2021	35.4	1,299,180
2026	36.2	1,328,540

Source: Population Estimates from Statistics Canada

Thus, within 25 years, Canada will need to add approximately 275,000 metric tonnes (live weight equivalent) of supply per year to maintain current per capita levels. Assuming there are no major increases in capture fisheries, this "shortfall" will need to be made up through increased imports and expanded domestic aquaculture production.

6. SWOT Analysis of Canada's Fisheries and Aquaculture Industry

A SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) is a popular and useful way to outline areas of potential action that will help in enhancing an industry's performance. Identification of competitive advantages and unique selling points is helpful in identifying market opportunities. A SWOT analysis is also useful in identifying areas of weakness, which could damage any potential marketing effort. Conducted effectively, a SWOT analysis is a powerful tool that gives a clear picture of an industry's overall competitive position.

SWOT Analysis of Canadian Fisheries:

Strengths:

- ✓ Industry is well-positioned geographically to serve markets in Asia, the U.S. and Europe
- ✓ Catches of higher value shellfish have stabilized at high levels
- ✓ Long term demand for capture seafood will remain strong as global production has peaked at the same time as populations are growing
- ✓ Canada has a reputation in major markets as a reliable supplier of high-quality, high-value seafood from a pristine environment
- ✓ Demand in primary markets such as the U.S. and China is growing rapidly
- ✓ Individual quotas have made the harvesting sector in some fisheries very profitable
- ✓ The aggressive approach of B.C.-based companies has made Vancouver a conduit for some U.S. seafood products to China
- ✓ Strong per capita consumption in Canada makes its domestic market attractive

Weaknesses:

- ✓ Landings are not likely to increase in groundfish or salmon
- ✓ Excess processing capacity has reduced profitability and efficiency of the processing sector
- ✓ Provincial political factors reduce efficiency of the processing sector and limit market opportunities (i.e. coldwater shrimp in Newfoundland)

- ✓ Seafood export marketing programs at the generic level are weak
- ✓ The decline in stocks of snow crab could have major negative impact on industry[11]
- ✓ Limited growth opportunities in the European market

Opportunities:

- ✓ China represents a long-term growth market for Canadian fisheries products
- ✓ Demand in the U.S. will keep growing due to the increasing population levels offering new market opportunities
- ✓ A stronger national export marketing program could help increase demand for Canadian seafood

Threats:

- ✓ Increased protectionism from the U.S. could lead to tariffs on some lower-priced Canadian seafood (i.e., coldwater shrimp)

[11] Increased snow crab landings, which coincided with declines in Alaska landings, provided much-needed income to fishermen and processors at a time when groundfish landings were in decline. Considerable investment has been made in the snow crab fishery and a decline would hurt the entire maritime Canada fishing industry.

SWOT Analysis of Canadian Aquaculture:

Strengths:

- ✓ Well-positioned to supply growing U.S. demand for high-quality fresh seafood (i.e. low transportation costs)
- ✓ Large, well-funded international aquaculture companies have a strong presence in Canada
- ✓ Significant bio-physical resource base with almost ideal environmental conditions for coastal and inland aquaculture
- ✓ Demand in primary markets such as U.S. and China is growing rapidly
- ✓ Well positioned to produce new high-value species for the Chinese market as technology develops (sablefish, geoducks)
- ✓ Strong per capita consumption in Canada makes the domestic market an attractive growth prospect

Weaknesses:

- ✓ Industry is not diversified -- reliant on salmon for 86% of finfish production and blue mussels for 65% of shellfish production
- ✓ Kudoa[12] is a major problem for Atlantic salmon producers in B.C.
- ✓ Weak seafood export marketing programs at generic level
- ✓ Expansion of aquaculture in B.C. is difficult due to opposition by environmentalists
- ✓ The industry is reliant on a single market, the U.S., for more than 90% of its exports
- ✓ A stronger Canadian dollar will reduce competitive advantages
- ✓ Low salmon prices have caused problems for producers

Opportunities:

- ✓ Production of higher value species for export to China
- ✓ Diversification of species for U.S. markets (cod, haddock, halibut, sablefish, wolffish, Mediterranean mussels)

[12] Kudoa is a microscopic parasite (*Kudoa thyrites*) which attacks farmed Atlantic salmon and results in soft flesh

- ✓ Demand in the U.S. will keep growing due to increasing population offering new market opportunities
- ✓ A stronger national export marketing program could help increase demand for Canadian seafood

Threats:

- ✓ A successful dumping action by Alaska salmon fishermen could have a serious impact on salmon farming industry
- ✓ Disease outbreaks could increase production costs
- ✓ Environmental groups could limit expansion
- ✓ Continued rapid Chilean farmed salmon exports
- ✓ Pending free trade agreement with Chile and the possibility that the U.S. could enhance aquaculture trade with that country

Section II:
Trends in Leading Seafood Markets

1. Canadian Seafood Consumption

Seafood consumption trends in Canada closely resemble those of the U.S. although per capita consumption in Canada is significantly higher. In 1999, for example, the last year for which Canadian data is currently available, Canadians consumed 42% more seafood than Americans on a per capita basis.

Between 1990 and 1999, Canada's per capita consumption of fresh and frozen non-processed finfish increased 14% from 9.9 pounds to 11.3 pounds. Consumption of shellfish increased even more, going from 3.3 pounds to 5.1 pounds, an increase of 54%.

Although it is not possible to make direct comparisons between the U.S. and Canada, as the statistical data is not the same, much of the increase in Canadian consumption is also probably from farmed shrimp and salmon. The large increase in shellfish consumption is likely a result of increased Canadian shellfish production, as well as an increase in warmwater shrimp imports.

Table 7. Canada's Per Capita Seafood Consumption (edible weight in pounds)

Products	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Fresh and Frozen	9.4	9.4	10.7	10.7	10.5	8.7	9.9	9.4	8.8	10.9
Processed	6.5	5.8	4.2	6.2	4.1	4.8	4.3	5	5.2	5.5
Shellfish	3.3	3.3	3.9	3.5	3.2	3.3	3.6	4.1	4.6	5.1
Freshwater fish	.5	.5	.5	.5	.4	.4	.4	.4	.4	.4
Total	**19.7**	**19**	**19.2**	**20.1**	**18.3**	**17.2**	**18.3**	**18.9**	**18.9**	**21.9**

Source: DFO

Top Aquaculture Species Consumed in Canada

1. **Shrimp**
2. **Salmon**
3. **Tilapia**
4. **Trout**
5. **Oysters**
6. **Mussels**

2. United States

Overview

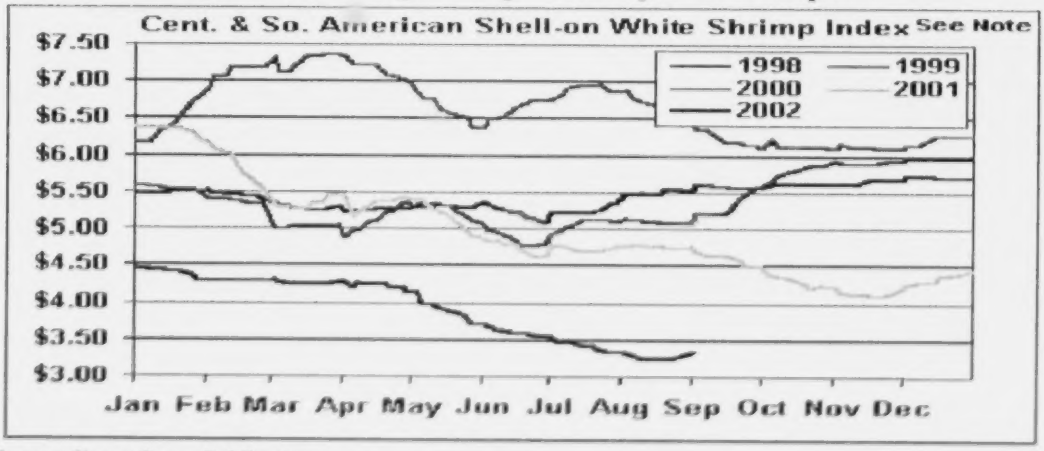
Although the United States ranks in the top five countries in the world in terms of capture fishery production, the U.S. runs a trade deficit in seafood and remains the world's second largest seafood importer after Japan. For 2000, the U.S. seafood market was valued at $25.5 billion at the wholesale level and $54 billion at the consumer level.

The volume of seafood consumed in the U.S. continues to steadily increase. In 2001, total per capita consumption (edible weight) reached 4.2 billion pounds (1.9 million metric tonnes), an increase of two percent over 2000. On a round weight basis, this total would be approximately 6 million metric tonnes.

On a volume basis, seafood sales in the U.S. market are almost evenly split between retail and foodservice. However, on a retail price basis, foodservice accounts for about two-thirds of U.S. seafood sales and retail accounts for one-third. This is because the markup at the foodservice level is generally higher than at the supermarket level.

The types of fish consumed in the U.S. have changed significantly in recent years, as aquaculture producers have greatly increased production, making some high-quality seafoods more affordable to U.S. consumers.

Figure 20. Falling Shrimp Prices Spur Consumption



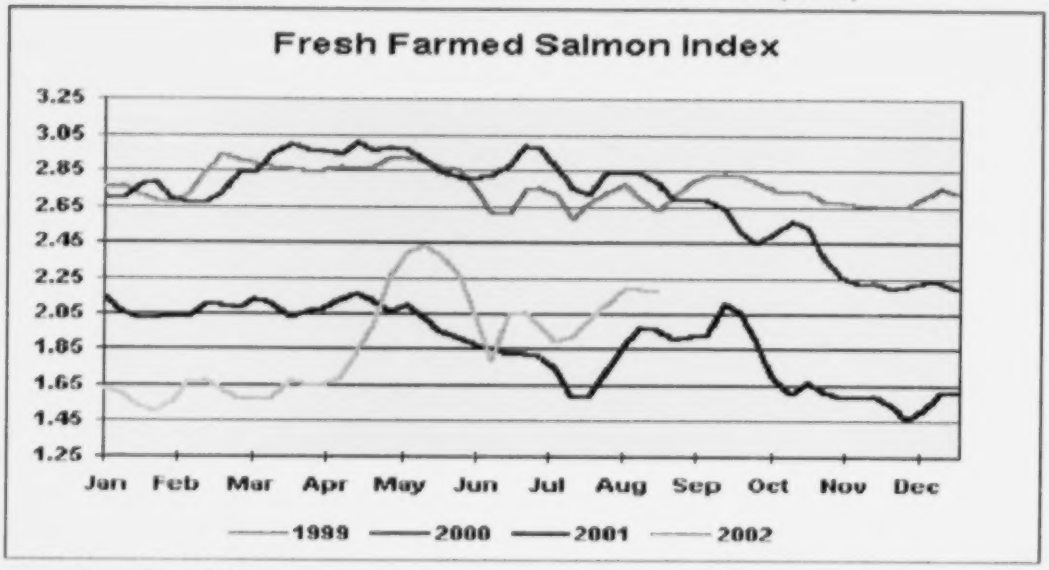
Source: Urner-Barry Publications

Shrimp, for example, still considered a high-priced seafood in the minds of many consumers, became the most popular seafood consumed in the U.S. for the first time in 2001, when it surpassed canned tuna. Since 2000, low shrimp prices have spurred consumption. Since the beginning of 2000, for example, the average price of white shrimp has declined from more than $7 a pound to less than $3.50 a pound (see Figure 20). This has led large restaurant chains such as Red Lobster to feature "All-

You-Can-Eat" shrimp promotions, in this case for $12.99. The chain now buys more than 20,000 metric tonnes of shrimp a year, most of it from Asia.

Low prices have also led to an increase in the consumption of farmed salmon (Figure 21), which has become the third most popular seafood consumed in the U.S. after shrimp and canned tuna. Costco, the largest operator of discount warehouse stores in North America, now sells more than 15,000 metric tonnes of fresh farmed salmon fillets a year. Ten years ago, the chain didn't even sell fresh fish. Although farmed salmon prices have recovered since this spring, over the long-term prices should remain at relatively low levels, making farmed salmon a good value for consumers.

Figure 21. Farmed Salmon Prices Recover (US $)



Source: Urner Barry Publications

Farmed fish now account for two of the other top 10 seafoods consumed in America: catfish, which is farmed in the Mississippi Delta, and tilapia, which is farmed in Latin America and Asia.

Almost half the fresh and frozen seafood consumed by Americans is now farmed. The consistent quality and relatively low price of farmed seafood has made it an excellent value in the eyes of consumers. Buyers also like farmed seafood, which is much easier to buy than wild caught fish because supply, pricing and availability are more consistent, which makes the buyers' job much easier.

Retail Trends

The most significant single trend in retail sales of seafood in the U.S. has been the emergence of discount chains as significant sales outlets for seafood. Seafood sales at Costco, for example, are approaching $750 million a year.

Wal-Mart has also become a large seafood buyer as it expands its Supercenters, which are a combination general discount merchandise stores and supermarkets. Wal-Mart currently has more than 1,100 Supercenters and is about to rapidly expand its smaller Neighborhood Market concept in urban markets.

The pressure on retailers to compete with discount chains has led to increased emphasis by retailers on running profitable seafood programs. The fact that super efficient Wal-Mart can operate at much lower food margins than traditional supermarkets has put pressure on large supermarket chains to increase their efficiencies to survive. As a result, some large supermarkets have removed full service seafood counters if they cannot maintain weekly sales of at least $5,000, a minimum level for profitability. The variety of seafood sold at supermarket counters has also been reduced.

Table 8. Leading U.S. Supermarket Chains

CHAIN	REGION	STORES	SALES $ MILLION	EST. FULL SERVICE SEAFOOD DEPTS.
The Kroger Co.	U.S.	2,429	$46,726	1,600
Safeway	U.S.	1,568	31,451	769
Albertson's	Pacific, Mountain, S. Atlantic	1,713	30,207	800
Wal-Mart	Mid-west, south	1,103	28,247	800
Ahold USA	East	1,245	24,104	1,000
Delhaize America	New Eng., mid-west, south	1,464	15,231	500
Publix	South	687	14,624	400
Winn-Dixie	South	1,141	13,021	300
Great A&P Co.	East	519	8,540	300
Supervalu	Mid-west, Atlantic	550	7,396	300

Source: Progressive Grocer magazine

U.S. supermarkets have also increased their margins on seafood, from an average of about 30% to 40 or 50% in an effort to make their seafood programs profitable. This has led to some complaints, most notably by shrimp and salmon suppliers, that supermarkets are not passing the full benefits of lower prices on to their customers.

Foodservice Trends:

The poor performance of the U.S. economy, the collapse of the late 1990s stock market bubble and the lingering effects of September 11, 2001 have hit some segments of the restaurant industry hard, most notably the white tablecloth segment. Sales at many restaurants in this sector are down at least 20% from their previous highs. Although most operators say there has been some recovery this year, the sector is still considered weak. Since this segment serves a relatively high percentage of seafood, it will have a negative impact on the sale of more expensive seafood products.

Sales at some mid-scale dining operators, on the other hand, remain strong, as U.S. consumers opt for a moderate dining-out experience. Sales by Darden Restaurants, which operates mid-scale restaurants such as Red Lobster and Olive Gardens, were up almost 10% for its most recent fiscal year, which ended in May. Sales of seafood

targeted at many mid-scale chains can be expected to remain relatively strong, although competitive pressures will likely prevent any significant rise in prices.

Table 9. Leading Seafood Restaurant Chains

RESTAURANT CHAIN	REGION (Number of Outlets)	ANNUAL SALES ($Million)
Red Lobster (Darden Rest. Group)	National (636)	$2,285
Long John Silver's (Yorkshire Global Rest.)	National (1,225)	$735
Landry's/Joe's Crab Shack	South/Southwest (150)	$506
Captain D's Seafood	East, Mid-West (562)	$488
Legal Seafood	East (26)	$138
Shells Restaurants	South/Mid-West (29)	$56

Source: Nation's Restaurant News and WorldCatch News Network

Seafood sales at quick service seafood restaurants such as Long John Silver's and Captain D's are not expected to increase significantly in the near future. These chains compete in the highly competitive quick service segment and the fact that white fish prices have risen slightly has made it harder for them to perform well financially.

Important Trends in the U.S. Seafood Market

Imports Now Account for 53% of the U.S. Seafood Supply and Importers Have a Powerful Role in the U.S. Value Chain

- Importers have the most complete knowledge of major foreign suppliers and trends in production.
- Importers often purchase for major retail and foodservice elements of U.S. value chains and product is packed under retail/foodservice brands.

Distributors Are an Important Link with Retail and Foodservice Operators

- Most major U.S. cities have only a few key specialty seafood distributors and broadline foodservice distributors.
- Seafood distributors often have the power to influence purchasing decisions by major restaurants and retail supermarket chains.

Consolidation Within the U.S. Retail Supermarket Sector Will Force Greater Efficiencies and Consolidation Within Other Segments of the U.S. Value Chain

- The top five chains now have more than a 50% share of the retail market.
- There are fewer retail chains, resulting in fewer and larger seafood suppliers.

Power is Already Consolidating Within Foodservice Distribution and Is Under Way in Seafood Distribution

- Sysco Corporation is largest the broadline foodservice distributor with 13 percent of market.
- Mergers and acquisitions will producer fewer but larger seafood distributors.

Retail and Foodservice Seafood Buyers Have Significant Power but Generally Exercise It Only in Pursuit of "Best Price"

- Environmental and eco-labeling issues not on most "radar screens."
- Retailers under pressure to make seafood departments profitable.

Consumers Are Potentially a Major Force in U.S. Value Chain But Rarely Exercise Power in Their Purchases

- Most products that consumers purchase are undifferentiated commodities without any brand or source information.
- Consumers are generally unfamiliar with conservation and environmental issues regarding seafood.

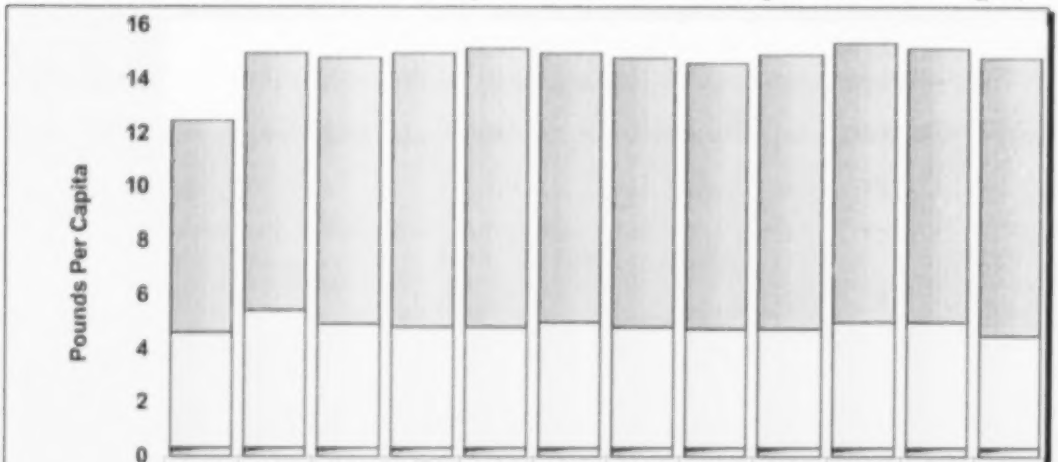
United States Seafood Consumption

Total U.S. seafood consumption has fluctuated within a narrow range for the past 10 years, from a high of 15.2 pounds per capita in 1994 and 2000 to a low of 14.6 pounds in 1997.

Seafood consumption has not increased in the U.S. for a number of reasons. Chief among them is the lack of an industry-wide generic campaign to promote the benefits of seafood and educate consumers on how to enjoy it. In spite of the obvious benefits of such a program, the U.S. seafood industry remains firmly opposed to any mandatory marketing assessment, as it is viewed as an unwanted tax that will reduce the financial performance of seafood companies.

Consumption of fresh and frozen seafood has fluctuated from a low of 9.9 pounds in 1997 and 1992 to a high of 10.4 pounds in 1999 and 1994. Consumption of canned seafood has fluctuated from a high of 5.1 pounds in 1990 to a low of 4.2 pounds in 2001 due to lower consumption of canned tuna.

Figure 22. U.S. Seafood Consumption (Pounds Per Capita Edible Weight)

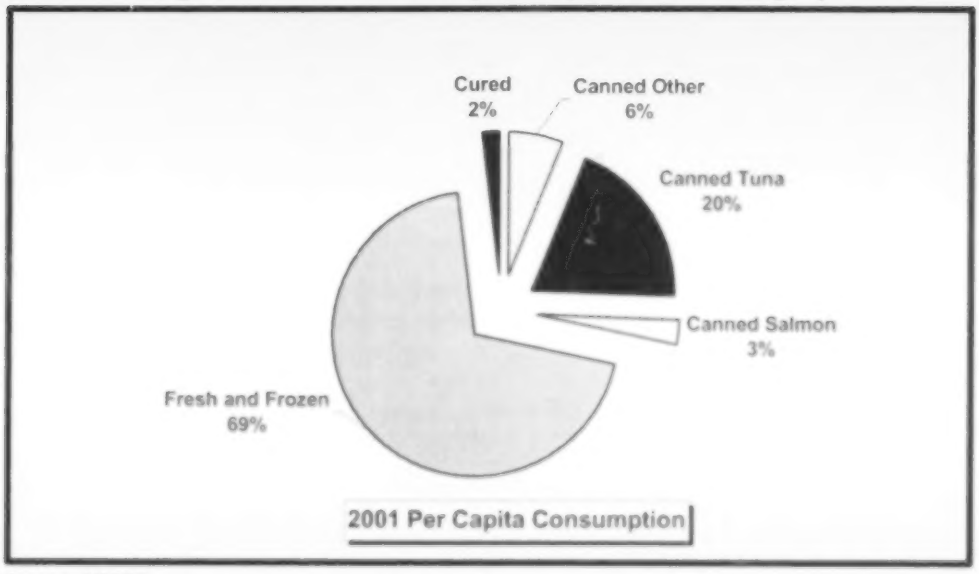


	1980	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total	12.5	15	14.8	15	15.2	15	14.8	14.6	14.9	15.4	15.2	14.8
Fresh/Frozen	7.9	9.6	9.9	10.2	10.4	10.0	10.0	9.9	10.2	10.4	10.2	10.3
Canned	4.3	5.1	4.6	4.5	4.5	4.7	4.5	4.4	4.4	4.7	4.7	4.2
Cured	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3

Source: NMFS

Fresh and frozen seafood accounts for almost 70% of all the seafood consumed in the U.S., followed by canned tuna at 20%.

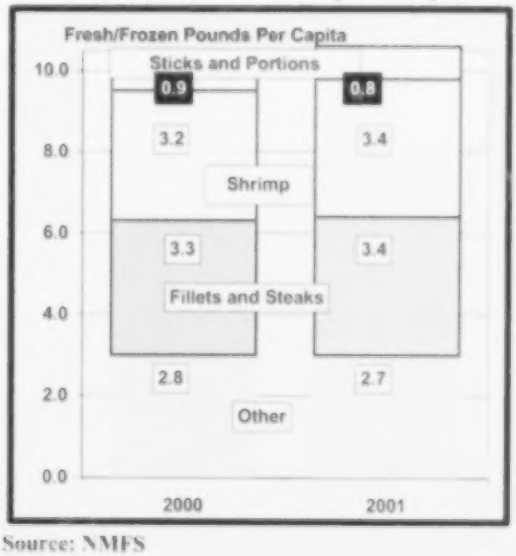
Figure 23. U.S. Consumption by Product Category



Source: NMFS

In 2001, for the first time, shrimp became the most popular seafood consumed in the U.S., as canned tuna consumption declined 17% to 2.9 pounds. Low shrimp prices and a continued decline in the canned food category are most often cited as the reason for the change.

Figure 24. Fresh and Frozen Consumption by Product Category



Source: NMFS

Although total consumption has not changed significantly in recent years, there has been a change in the types of fresh and frozen seafood consumed. As mentioned

previously, almost half of the fresh and frozen seafood eaten by U.S. consumers is now farmed. In the last five years, for example, consumption of shrimp has increased 30% and salmon consumption has increased 57% due to a large increase in farmed supplies. Consumption of cod, on the other hand, a traditional favorite, has declined 47% over the same period.

Table 10. Top Ten U.S. Seafoods 1997 - 2001

Rank	1997		1998		1999		2000		2001	
	Item	Lbs	Item	Lbs	Item	Lbs	Item	Lbs	Item	Lbs
Consumption		14.6		14.9		15.4		15.2		14.8
1.	Canned Tuna	3.10	Canned Tuna	3.40	Canned Tuna	3.50	Canned Tuna	3.50	Shrimp	3.40
2.	Shrimp	2.70	Shrimp	2.80	Shrimp	3.00	Shrimp	3.20	Canned Tuna	2.90
3.	Pollock	1.64	Pollock	1.65	Salmon	1.70	Pollock	1.60	Salmon	2.02
4.	Salmon	1.29	Salmon	1.38	Pollock	1.57	Salmon	1.58	Pollock	1.21
5.	Cod	1.06	Catfish	1.06	Catfish	1.16	Catfish	1.08	Catfish	1.15
6.	Catfish	1.02	Cod	0.97	Cod	0.77	Cod	0.75	Cod	0.56
7.	Clams	0.46	Crab	0.57	Crab	0.54	Clams	0.47	Clams	0.47
8.	Crab	0.42	Flatfish	0.39	Clams	0.46	Crabs	0.38	Crabs	0.44
9.	Flatfish	0.33	Clams	0.39	Flatfish	0.39	Flatfish	0.42	Flatfish	0.39
10.	Halibut	0.29	Oysters	0.23	Scallops	0.20	Scallops	0.27	Tilapia	0.35

Source: U.S. National Fisheries Institute

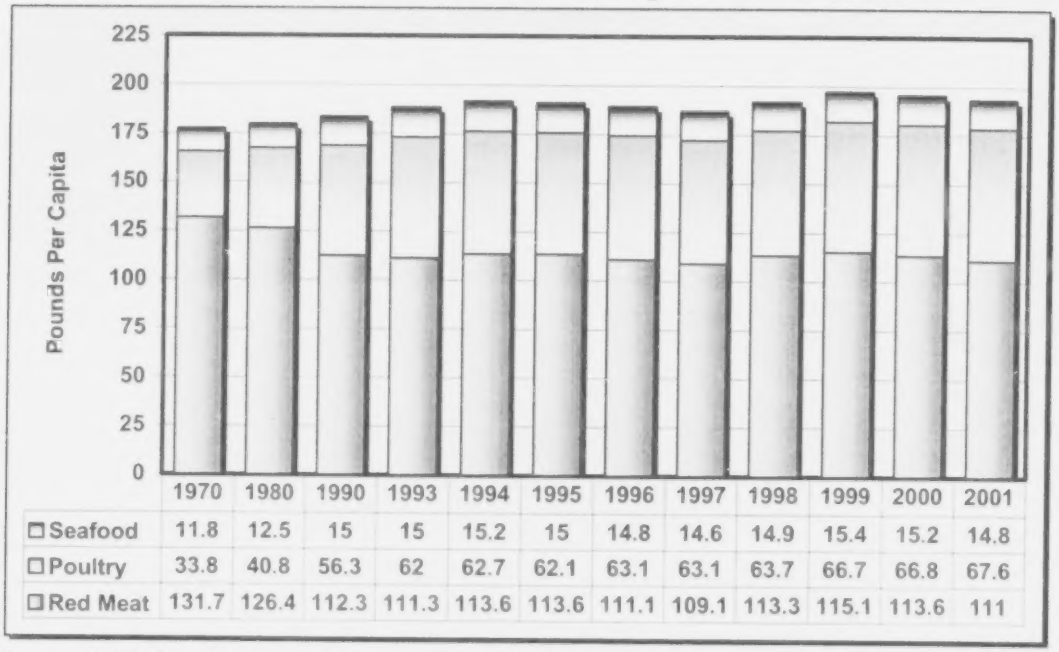
Top Aquaculture Species Consumed in the United States

1. **Shrimp**
2. **Salmon**
3. **Catfish**
4. **Tilapia**
5. **Trout**
6. **Oysters**
7. **Mussels**
8. **Manila clams**
9. **Hybrid striped bass**

U.S. Protein Consumption

After rising rapidly in the 1980s, U.S. protein consumption has increased only modestly in recent years. Most of the increase in protein consumption has been in poultry, primarily chicken. Since 1980, U.S. poultry consumption has increased 66% to a record 67.6 pounds per capita in 2001. Over the same period, consumption of red meat has declined 12%, while seafood consumption has increased 18%. It appears that U.S. consumption of red meat and seafood has stabilized, while consumption of poultry will continue to increase slightly.

Figure 25. U.S. Protein Consumption 1970 - 2001



	1970	1980	1990	1993	1994	1995	1996	1997	1998	1999	2000	2001
Seafood	11.8	12.5	15	15	15.2	15	14.8	14.6	14.9	15.4	15.2	14.8
Poultry	33.8	40.8	56.3	62	62.7	62.1	63.1	63.1	63.7	66.7	66.8	67.6
Red Meat	131.7	126.4	112.3	111.3	113.6	113.6	111.1	109.1	113.3	115.1	113.6	111

Source: United States Department of Agriculture (USDA), NMFS

3. Japan

Overview

Japan is the most important seafood market in the world and hence a significant power centre. While China consumes a large volume of seafood, seafood demand in Japan has historically had the greatest impact on world fisheries and international trade.

The Japanese seafood market is dominated by several prominent forces, including social, political and economic ones. On the social side, seafood forms a major component of the Japanese diet and per capita consumption (152.1 pounds live weight) is among the highest in the world.

Changes in Japanese seafood demand have a major effect in markets and fisheries around the world. For example, the large increase in Japanese imports of farmed Chilean coho salmon and steelhead trout has led to major price declines for wild sockeye salmon, which has led to a sharp reduction in the number of salmon fishermen and processors in both the U.S. and Canada.

The increased purchases of live king crab from Russia has caused severe problems for Canadian snow crab producers from the Gulf of St. Lawrence, who have been forced to lower their prices so they can sell their crab in the U.S. market.

For the past 10 years, the poor economy has had a negative impact on overall seafood sales in Japan. Over the long term, changes in the Japanese diet, demographics and food expenditures will also have significant impact on fisheries around the world, as Japanese per capita seafood consumption continues to decline.

On the economic side, a stagnant economy, the weakened yen and resulting high consumer prices for imported products are putting pressure for change on a cumbersome, expensive and inefficient multi-layered value chain. This economic upheaval is changing how Japanese consumers purchase seafood, where they make these purchases and even the form of the products.

The Major Trends in the Japanese Seafood Market

The Japanese seafood market is getting smaller

- Supply is falling
- The population is ageing
- The economy continues to impact demand
- Shrimp consumption is declining
- There is a trend toward lower household expenditures for seafood

As Japan's seafood market shrinks, traditional power over global seafood commodities will decline

Prices are deflating

- McDonald's cheeseburger price dropped in half
- Salmon and shrimp prices have collapsed as higher price restaurants shut down

How seafood is distributed and sold is changing

- Japanese retailers have less power
- There is a growing number of bankruptcies (Mycal -- #4 supermarket chain)
- Wal-Mart and Carrefour expanding rapidly
- There is a slow decline of central wholesale markets such as Tsukiji in Tokyo
- Trading companies are investing in retailers to counter trend of retailers importing directly; they are in effect buying their customers.

Domestic seafood production is falling

- Distant water catch is 45 percent lower than 10 years ago.
- Coastal catches down 54 percent over the last decade.
- Aquaculture production[13] is likely to decrease as production moves to China, where costs are lower.

Imports have filled the void

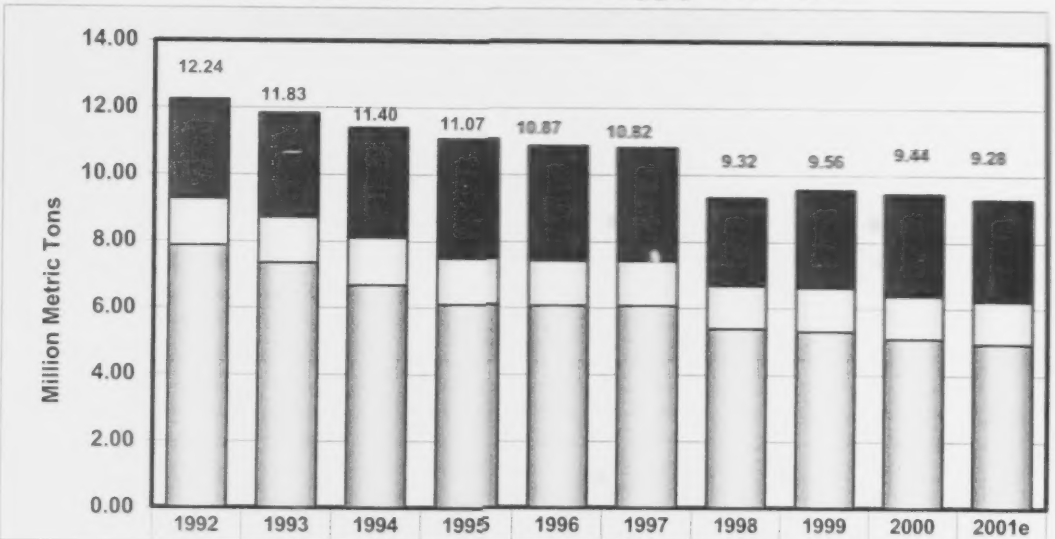
- Shrimp leads in volume and value.
- The salmon supply is up to 380,000 metric tonnes.
- More seafood destined for Japan is reprocessed in China.

[13] Japanese aquaculture production peaked in 1994 at 1.42 mmt and currently is stagnant at approximately 1.3 mmt. Near shore pollution and lack of adequate sites will likely limit any future growth in aquaculture production.

Japanese Seafood Supply Declining

Japan's seafood supply in the year 2000 was almost 9.4 million metric tonnes, a decline of 23 percent over the previous decade. Of this supply, 6.35 million metric tonnes came from domestic production, including 1.35 million metric tonnes from aquaculture, and 3.1 million metric tonnes were imports, worth $15 billion. With a shrinking high seas fleet and less productive local waters, Japan's wild catch has fallen almost every year over the past decade and is currently 4.68 million tonnes lower than 1990 levels.

Figure 26. Japanese Seafood Supply 1992-2001



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001e
■Imports	2.97	3.12	3.30	3.58	3.45	3.41	2.64	2.93	3.06	3.04
□Aquaculture	1.40	1.36	1.42	1.39	1.35	1.34	1.29	1.32	1.29	1.29
□Wild Catch	7.87	7.35	6.68	6.10	6.07	6.07	5.39	5.31	5.09	4.95

Source: Japan Fisheries Association

Tuna and mackerel were the leading fish species imported into Japan in volume in the year 2000, but frozen shrimp led all categories in both volume and value. Yellowfin tuna, Atlantic salmon and bigeye tuna led the fresh fish category.

Marine Fisheries

Over the past decade, production from Japan's domestic fishing industry has fallen sharply. Since 1990, total Japanese fishery production[14] has declined by 40 percent, with catches within the Japanese Exclusive Economic Zone (EEZ) recording the largest drop (54 percent). Reasons for this drop in the catch include both overfishing and pollution and reduced access to distant fishing grounds.

[14] Production figures may differ from those in the overall supply chart as government data includes seaweed, sea cucumbers and marine mammals.

The most important marine species landed by the Japanese fishing fleet include squid, anchovy, Alaska pollock, mackerels, sardine and tuna.

Aquaculture

Although aquaculture production has filled much of the supply void that resulted from declines in marine fisheries on a global basis, this has not been the case in Japan. Over the past decade marine aquaculture production has changed very little (1.27 million metric tonnes in 1990 vs. 1.25 million metric tonnes in 1999).

Most coastal areas suitable for aquaculture have been developed and future growth will require new technologies (open ocean or shore-based). However, given the high production costs in Japan it is unlikely that this growth will occur in Japan. In reality, Japanese aquaculture production will probably decline in the future as more production is transferred offshore to cheaper producers, especially China. Already, China has become the largest supplier of farmed eel to Japan and China is now growing large quantities of red sea bream as well.

Table 11. Leading Japanese Seafood Imports 2000 - 2001 Metric Tonnes

	2000	2001
Live Seafood		
Eels	14,356	17,375
Fresh Fish		
Yellowfin tuna	35,795	36,282
Atlantic salmon	27,596	29,621
Bigeye tuna	21,969	21,605
Frozen Fish		
Mackerel	158,909	173,850
Pollock surimi	106,505	142,213
Yellowfin tuna	100,641	83,936
Pacific coho salmon	66,910	88,577
Pacific pink salmon	59,829	82,990
Pacific sockeye salmon	54,078	49,633
Skipjack tuna	56,546	77,490
Fresh Shellfish		
Tanner crab	27,113	29,550
Clams	23,487	21,874
King crab	20,948	16,069
Oyster	15,900	14,892
Frozen Shellfish		
Shrimp	247,314	245,049
Octopus	116,260	85,680
Tanner crab	33,807	26,927
Salted/Dried/Other Products		
Eel	71,313	69,385
Herring roe	8,510	7,920
Salmon roe	4,662	4,410
Pollock roe	1,970	1,931
Fish meal	333,463	473,160

Source: NMFS from Japanese data

Imports

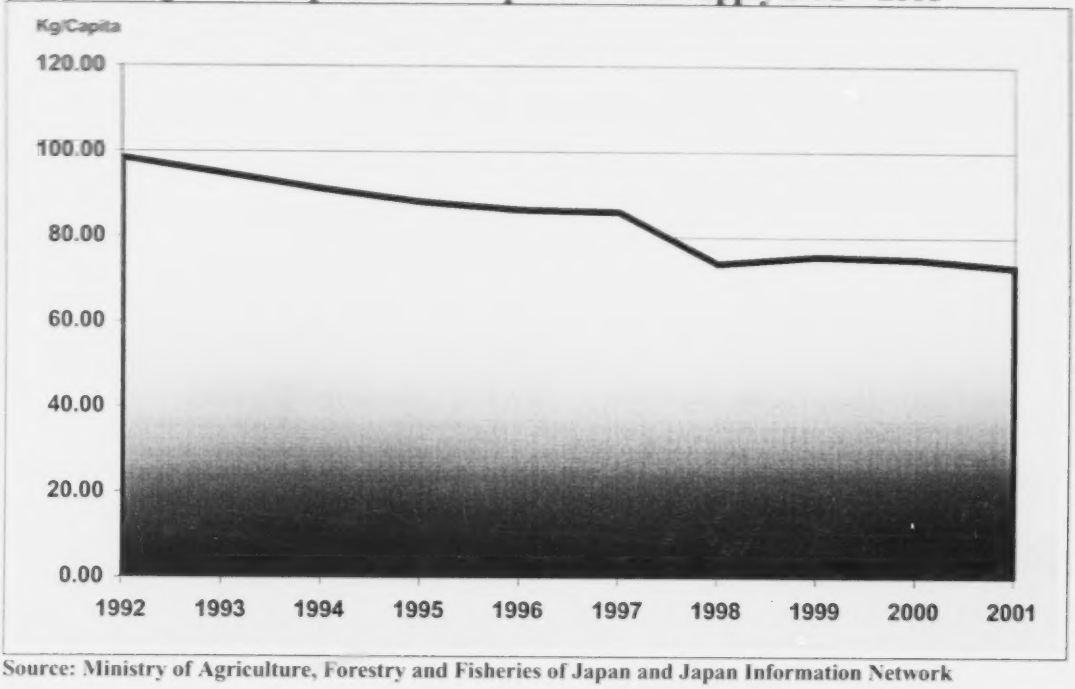
Imported seafood plays a critical role in the Japanese seafood supply picture. Shrimp, the most popular seafood (on a consumption basis) in Japan is supplied almost entirely from imports, primarily from Indonesia, Thailand, India and, most recently, Vietnam. To satisfy domestic demand, there is also heavy reliance on imports of tuna, the second most popular seafood. Japanese tuna buyers are positioned literally around the world to supply fresh and frozen tuna (yellowfin, bluefin and bigeye) to Japan.

Japanese shrimp imports have been falling steadily over the past five years, in spite of the fact that global shrimp production has been increasing due to higher farmed production, with prices being at very low levels. In 1994, Japan imported 316,874 metric tonnes of shrimp. Imports fell to 308,306 tonnes in 1995 and 301,603 tonnes in 1996. Shrimp imports in 2001 were 2,000 tonnes lower at about 245,000 metric tonnes.

Japanese Seafood Consumption

Both per capita and household consumption of seafood are declining in Japan, with shrimp and yellowtail recording the most significant drops. The weak economy no doubt accounts for the drop in shrimp consumption. However, a weak yen compared to the U.S. dollar has diverted some product to the U.S. market. U.S. shrimp imports have been at record levels in recent years. Yellowtail is farmed in Japan and the decline in this fish, used in fresh, top quality sashimi, reflects a trend toward less expensive sushi restaurants such as kaiten sushi restaurants, which use sushi-making robots and conveyor belts.

Figure 27. Japanese Per Capita Seafood Supply 1992 – 2001



Source: Ministry of Agriculture, Forestry and Fisheries of Japan and Japan Information Network

Salmon consumption has increased significantly in Japan, up more than 64 percent between 1991 and 1996. This rise in consumption has resulted from increased imports of farmed coho, steelhead trout and Atlantic salmon. According to a U.S. Department of Agriculture report[15], reduced prices for salmon and trout in the market have helped improve consumption. In the retail sector, "nama-sake" (fresh/chilled) salmon remains more popular than "ship-sake" (salted salmon). This trend may be influenced by health conscious consumers moving away from salty foods.

Effective July 1, 2000, mandatory place-of-origin labeling for all fresh seafood was required under the revised Japanese Agricultural Standard (JAS) Law. The law

[15] Japan Fishery Products Annual 2000, USDA, FAS GAIN Report #JA0107, 10/2/2000

requires that retailers indicate the name of the product, place of origin and whether the product is frozen or thawed and farm raised or wild. Wild salmon producers hope to use this law to position their product as more "natural" than farmed salmon.

The decline in household consumption of fresh and frozen seafood appears to have started in 1994. According to a 1998 analysis of household food consumption by the Japanese Ministry of Agriculture, Forestry and Fisheries, consumption peaked in 1993 at 49,938 grams. The Ministry attributes the decline in household expenditures on seafood to the deteriorating economy. For 2000, Japanese household spending on food declined a real 1.7 percent from the previous year, the 10th straight year of declines.

Although a more recent species-specific consumption analysis is unavailable, it appears that the major trends are continuing. As Figure 27 indicates, on a per capita basis the seafood supply in Japan has been declining steadily. Over the long term, the market in Japan will shrink. According to Japan's National Institute of Population and Social Security Research the Japanese population is expected to peak in 2006 at 127.7 million and will decline after that to 100.6 million by 2050.

4. European Union

Overview

Although the European Union represents a sizeable seafood market of some 379 million consumers, it remains highly differentiated among the 15 member nations. While some generalizations can be made about the EU seafood market, particularly overall size and trends, there are significant differences in demand within the EU market itself.

EU Seafood Supply

Overall, the EU represents a significant market for seafood and runs a high trade deficit in this category. For 2000, EU countries exported approximately 5.3 million metric tonnes of seafood and imported 8.7 million metric tonnes for a negative trade imbalance of about 3.4 million metric tonnes and $10.1 billion Euros.[16]

This trade imbalance has resulted from significant declines in historic landings of groundfish, particularly in the North Atlantic. The imbalance has also resulted from large increases in the importation of fresh farmed salmon from Norway.

Table 12. EU Seafood Consumption

Country	Population (Millions) July 2001	Estimated Per Capita Seafood Consumption (Kg Round Weight)
Austria	8.1	11 Kg
Belgium	10.3	20 Kg
Denmark	5.4	24 Kg
Finland	5.2	33 Kg
France	59.6	28 Kg
Germany	83.0	15 Kg
Greece	10.6	23 Kg
Ireland	3.8	17 Kg
Italy	57.7	21 Kg
Luxembourg	.4	N/a*
Netherlands	16.0	15 Kg
Portugal	10.1	57 Kg
Spain	40.0	39 Kg
Sweden	8.9	17 Kg
United Kingdom	59.7	23.6 Kg

Source: European Commission
*** N/a: not available**

The largest seafood markets in the EU are Spain, France, the U.K., Germany and Italy, respectively.

[16] Source: Fisheries Yearbook 2001, European Commission

Each of the major European markets has distinct preferences in terms of product form and channels of distribution. Overall, 70% of the seafood sold in Europe is through foodservice outlets (as opposed to the United States where the figure is roughly 50%). However, in some EU countries the retail to foodservice ratio is almost the reverse. While Spanish consumers prefer fresh seafood (74% by volume), the figure drops to just 25% for the United Kingdom. In Germany, canned seafood represents 34% of all seafood consumed while in France the figure is just 19% (versus 31% in the United States). There are even differences within nations. Seafood is much more popular in Northern Germany than Southern Germany, for example.

Table 13. Seafood Consumption by Category (1999) Percent of Volume

	France	Germany	Italy	Spain	United Kingdom
Fresh	48%	28%	55%	74%	25%
Frozen	22%	21%	23%	12%	30%
Canned	19%	34%	18%	13%	21%
Smoked/Dried	5%	5%	4%	1%	N/a
Other	6%	12%	N/a	N/a	N/a
Total	100%	100%	100%	100%	100%

Source: Irish Fisheries Board

While much of the seafood in Europe moves through foodservice channels, supermarket consolidation and growth will likely increase the percentage of seafood moving through retailers. Several U.S. retailing giants (Safeway, Wal-Mart) have moved into Europe and two European companies (Ahold and Delhaize) have moved into the U.S. market.

One of the more significant trends in Europe is the offensive and defense actions being taken by European retailers as Wal-Mart enters the market. Currently Wal-Mart has a presence in the United Kingdom and Germany. For many retailers it is an "eat or be eaten" defense. The shakeout in European supermarkets and hyper-markets will profoundly affect seafood retailing as well as the value chain in general. Larger retail chains will make more direct and central purchases of seafood, particularly aquaculture products such as salmon where large, reliable suppliers are available.

Carrefour, a French-based company, and the Dutch retailer Ahold are the strongest global retailers, both with stores in over 20 countries.

Despite ongoing supply problems and rising prices, the consumption of fish and seafood is forecast to increase in all of the major European markets. This trend is attributed to such factors as the move towards "healthy eating" and lifestyles, the recent scare over meat safety and the increases in value-added fish and fish products dictated by demographic and societal changes.

Seafood consumption in Europe has increased in recent years, partially as a result of the threat to humans posed by bovine spongiform encephalopathy (BSE), also called "mad cow" disease and hoof-and-mouth disease.

The total retail market for fish and fish products in the five largest markets (Germany, France, the UK, Italy and Spain) was estimated at 3.1 million tonnes in 2000 with

Spain, the largest market, recording household purchases of almost 970,000 tonnes in 2000.

In the southern Mediterranean countries, traditional fresh fish and shellfish retain a strong hold on the consumer purchasing habits, although the Italian and Spanish preference for fresh fish is starting to decline as demographic and culinary habits undergo major change and convenience products become more important.

Meanwhile, the German and U.K. fish products markets are already characterized by a strong level of consumption in the further processed, value-added categories, such as canned and frozen fish. However, it is these markets that are also showing the least growth.

5. China

Overview

In China, there is a traditional saying that translates literally into "Without fish there is no dinner." Because of its high protein and low fat, seafood is considered by the Chinese to be extremely healthful and flavorful. It's also considered to make people smart.

So with a population of 1.3 billion that has a natural affinity for fish, it's no surprise that China has the world's largest seafood industry and the world's largest seafood market. Perhaps no other country will have more impact on the global seafood industry in the new millennium than China.

As China's living standards have improved, so has the country's appetite for seafood. In Shanghai, for example, seafood consumption has passed that of red meat. Per capita seafood consumption in China's largest – and most affluent – city has grown to almost 25 kilograms (live weight) a year, more than triple the country average.

To meet its growing demand for seafood, the Chinese government has placed a very high priority on increasing its production of aquatic products. Since 1980, when China instituted its market reform policy, the country's fishery catch has increased from approximately 4 million metric tonnes to just over 17 million metric tonnes in the year 2000. Over the same period, China's aquaculture production increased from less than 2 million metric tonnes metric tonnes to 25 million metric tonnes.

China's combined production of aquatic products (fish, reptiles and seaweeds) is approximately 30 percent of the world's total. But the rapid growth in production has come with a price and many of the country's fisheries resources have been overfished.

In an effort to conserve its fish stocks, China has officially adapted a "zero-growth" policy on ocean catches. In addition, the Chinese government has instituted seasonal fishing bans along most of its coast and in some lakes.

The Chinese seafood market consumes a wide variety of seafood, from very expensive items like live crab, abalone and lobster to lower value species such as frozen ribbonfish, squid and carp. Chinese consumers spend a very high percentage of their disposable income on food, especially on dining out, which is an integral part of their culture. The quality and variety of seafood available for at-home consumption is also rapidly improving, especially in large coastal cities where international retail chains are rapidly expanding.

Although the quantity is relatively small when compared to domestic production, China has sharply increased its seafood imports, which are used both for domestic consumption and for raw material for a large seafood reprocessing industry in northern China. From 1990 to the year 2000, China's seafood imports have grown from less than 300,000 metric tonnes to more than 1.2 million metric tonnes.

China's seafood imports would probably be significantly larger if it were not for high tariffs on imported seafood that is used for domestic consumption. As a condition of joining the WTO, China agreed to lower tariffs to an average of less than 10% by the

year 2004. This can be expected to lead to even stronger growth in imports, as the lower prices will expand the market for imported seafood.

The most dynamic companies in China's seafood industry are private domestic companies, joint ventures between Chinese companies and overseas companies and wholly owned subsidiaries of overseas companies. Although many of these companies have investments from local and municipal governments, they are not considered state-owned companies.

Major Trends in the Chinese Seafood Market

Chinese demand for seafood is growing rapidly

- Chinese love seafood – "Without fish there is no dinner."
- Demand is growing as the population becomes more affluent.
- Imports are increasing and will increase more rapidly after China joins the WTO and lowers its tariffs.
- The trend toward high household expenditures on dining out will continue.
- Consumption is highest in coastal areas, especially in affluent southern provinces like Guangdong and cities like Guangzhou, Shenzen and Shanghai.

Emphasis on improving quality in seafood distribution chain

- Quality of most domestic fisheries catch is still relatively low due to poor handling practices.
- Beijing has placed priority on improving quality of domestic seafood supply by promoting development of modern seafood wholesale markets and auctions.
- Chinese consumers will pay a large premium for live seafood because they know the quality is superior.
- Investments by international food retail chains such as Carrefour, Metro, Wal-Mart and Auchon are improving selection and quality of seafood, but most seafood is still sold through small wet markets.

Domestic seafood production is increasing

- Annual aquatic product production is 42.8 million metric tonnes – more than 30 percent of the world total, but production numbers may be overstated.
- Marine fish stocks are overfished so government has instituted conservation measures and a "zero-growth" policy on coastal fishing.
- Supply is growing due to large sustained increases in aquaculture production, which accounts for about two-thirds of total supply.
- The aquaculture industry is emphasizing production of more high-value species such as turbot, eel, white shrimp, abalone and sea bass.
- Chinese companies are active in high seas fisheries around the world, as they are the lowest cost producers.

Imports play an important role in the Chinese seafood market

- Since 1990, Chinese imports of seafood have grown from 300,000 metric tonnes to 1.2 million metric tonnes.
- Imports are consumed domestically or used by the large reprocessing industry in northern China.

- Chinese demand for some high-value species such as live spiny lobsters, geoduck clams, Dungeness crab and Chilean sea bass is now a determining factor in world market prices.
- High tariffs limit the demand for imported seafood.
- Smuggling of high-value live seafood through Hong Kong is widespread, despite a government crackdown.
- Lower tariffs after China joined WTO will lead to increased consumption of imported seafood in future.

Government remains the most important power centre in the Chinese seafood industry

- State-owned companies are the largest companies in the seafood industry.
- Local provincial and municipal governments are active investors in the seafood industry, sometimes as joint venture partners with overseas companies.
- The influence of private domestic and joint venture companies is growing, but the "blessing" of local government is critical to success of projects.
- International investment in the Chinese seafood industry is extensive, with most investment being from Taiwan, Japan and Korea.

China's Seafood Supply

Before discussing China's seafood production, it should be noted that there is no shortage of statistics, as Chinese officials publish voluminous reports. However, the accuracy of these statistics is somewhat suspect. In some cases, production statistics are likely to be overstated, while in other cases they are often underreported. In the opinion of the consultants, Chinese seafood production is probably overstated, although it is impossible to say by how much.

Domestic Fisheries

With an annual aquatic products harvest that reached an impressive 42.8 million metric tonnes in 2000, China is the world's dominant seafood producer, accounting for more than 30 percent of the world's total seafood production.

China's production from wild fisheries has stabilized at about 17 million metric tonnes. Of this total, in the year 2000, 14.8 million metric tonnes came from seawater production, while 2.8 million metric tonnes came from freshwater fisheries. China's latest *Fishery Law*, which went into effect on December 1, 2000, says that the growth in catches from both seawater and freshwater fisheries should be held at zero. If catches are in fact increased, they should be decreased by an equal amount in the following year.

China has also instituted complete seasonal fishing bans in the Bohai, Yellow, East China and South China seas. Fishing bans have also been enacted on large lakes such as Poyang Lake. Most of these bans take place from June through September when fish are spawning. In addition, the new *Fishery Law* allows regional Fisheries Bureaus to enact additional regulations such as minimum mesh sizes on nets.

In spite of the increased efforts at conservation, it is still widely believed that China's domestic fisheries resources are overfished by the country's more than 400,000 fishing vessels. Some fishermen, particularly in the South China Sea, still use destructive fishing practices such as dynamite and cyanide to catch fish. China has recently concluded agreements with countries that also fish in nearby waters. Japan and Korea have agreed to cooperate on fisheries conservation issues and an agreement is currently being negotiated with Vietnam.

The most common species caught in China's coastal fisheries include ribbonfish (hairtail), yellow croakers, threadfin bream, pomfret, eel (conger pike), squid, Japanese mackerel, sea bass (perch), sole, swimming crab and cuttlefish.

In terms of fisheries catches, China's leading provinces are: Shandong, Guangdong, Zhejiang, Fujian, Jiangsu and Liaoning, respectively.

Aquaculture Production

China has a long history of aquaculture, dating back thousands of years. As China's demand for seafood has grown, increasing the production of both saltwater and freshwater aquatic products through aquaculture has been a major focus of both national and regional governments.

In the year 2000, China's aquaculture industry produced a record 25.4 million metric tonnes. If this figure is accurate, it would represent approximately two-thirds of the world's total aquaculture production. Approximately 10 million metric tonnes of China's aquaculture production is from seawater farms.

Aquaculture in China can be divided into several primary categories. The traditional extensive aquaculture methods used low-density stocking and minimal feeding. The primary species produced by this method were freshwater species such as carp and tilapia. Carp, for example, is cultured throughout most of China and annual harvests exceed 5 million metric tonnes – more than the entire U.S. fisheries production.

In recent years, however, the emphasis in China has been on the growth of more high-value, profitable species that require more intensive farming methods, including higher stocking densities and feeding. These species include native species such as Mandarin fish, shrimp, scallops, clams, mussels, crab and oysters.

In the case of China's native white shrimp, *Penaeus chinenis*, however, production has soared quickly and then collapsed as the intensive farming of this species along the Gulf of Bohai in northern China, led to widespread losses from disease. While this species is still farmed, it is now farmed at much lower densities and most of the production is sold live to the domestic market. (In the late 1980s, large-scale production of this species briefly made China the leading source of imported fish for the U.S. market).

China has also had considerable success introducing non-native species to increase its production of high-value seafood. The native bay scallop from the Northeastern U.S., *Argopecten irradians*, was introduced in the 1980s, for example. Although only a few dozen scallops survived the trip, they were enough to develop a farmed scallop industry that currently produces more than 200,000 metric tonnes of bay scallops a year. A significant portion of this production is exported, primarily to markets in the U.S. Although, exports to the U.S. have declined in recent years due to poor harvests, for a number of years in the 1990s China was the leading supplier of imported scallops to the U.S. market.

In the past few years, China has accelerated its production of non-native, high value species. Large quantities of Pacific white shrimp, *Penaeus vannamei*, which is native to the west coast of Central and South America, are now being farmed in southern China. White shrimp, which China used to import from Ecuador, is considered by the Chinese to be much sweeter than black tiger shrimp, which is also farmed in China and imported from countries such as Vietnam, Thailand, India and Pakistan. Only two years after the species was introduced, China's harvest of Pacific white shrimp could reach 50,000 metric tonnes this year, exceeding the production of Ecuador, which has been farming shrimp since the late 1970s.

Chinese fish farmers have also started farming European turbot, *Psetta maxima*, which is sold live to restaurants in major cities such as Shanghai, Guangzhou and Hong Kong at prices that currently average about $15 a pound. Since turbot can be grown for about $6 a pound, a gold rush atmosphere has developed around this species, which is primarily farmed in Shandong Province in northeastern China. Pan Marine of Norway, a spin off from Pan Fish A/S, one of the four largest salmon-

farming companies in the world, announced in July 2001 that it was prepared to invest US $20 million to build the largest turbot farm in the world near Qingdao.

Among the non-native species farmed in China on a large scale are red abalone, North American red drum, Japanese snapper, freshwater eel, cobia, bass and grouper.

China's aquaculture industry has a distinct competitive advantage over aquaculture industries in other countries because it can sell a significant amount of its production live at a substantial premium. At times of the year such as the Chinese New Year, when demand for live seafood is at its peak, seafood, farmers will receive about $7 a pound for whole live shrimp, compared to less than $2 a pound for shrimp that has to be frozen. By selling so much seafood live, Chinese farmers can generate more revenue from the same volume than farmers in other countries who do not have access to a live market. As a result, Chinese farmers can export their frozen production and undercut the price of their competitors.

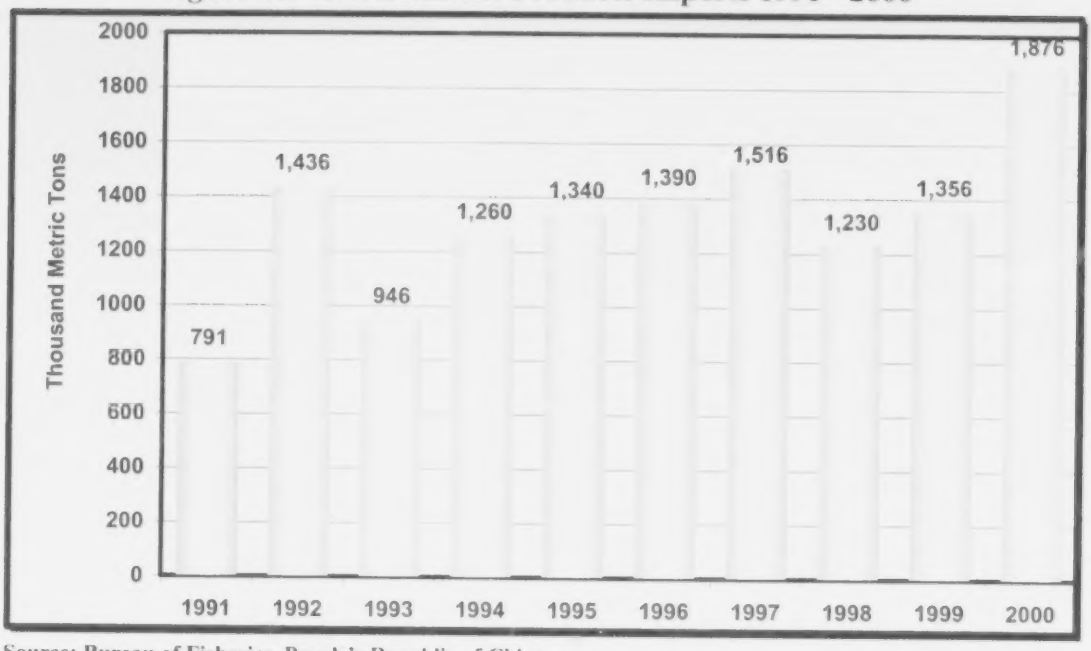
The competitive advantage of China's aquaculture industry and the concentrated effort by the Chinese government to encourage its development will lead to continued strong growth in this industry. Most Chinese fish farmers still use relatively primitive technology and only recently have some farms begun to use compound feeds and offshore cage systems. Chinese fish farmers can also be expected to among the first to adapt the use of genetically modified strains of fish that they can grow faster and cheaply. As China's aquaculture industry continues to develop, it can be expected to export some of its production, as well.

One problem limiting the growth of China's aquaculture industry, however, will be pollution along much of its coastal environment. In the year 2000, more than 10,000 square kilometres of red tides were reported, which had a negative impact on some shellfish operations. Increased coastal pollution is believed to be a contributing factor to the increased presence of red tide and other toxic algaes.

Imports

China has always had high tariffs on imported seafood and, until the 1990s, seafood imports were minimal. However, in the mid-1990s, with Chinese living standards rapidly improving and demand for higher quality seafood growing, the Ministry of Agriculture unofficially liberalized the rules that allowed state-owned Chinese fishing companies to import, duty free, seafood that they caught when operating joint ventures in other parts of the world.

Figure 28. China Marine Products Imports 1991 - 2000



Source: Bureau of Fisheries, People's Republic of China

Instead of using their duty-free quota to import fish they caught, state-owned fishing companies started using their duty-free quota to import a wide variety of seafood that they did not catch. The state-owned companies also sold their duty-free quotas to private companies, which, in turn, used the quotas to import seafood without paying a tariff. Although both of the practices were illegal, the practice was allowed by the Ministry of Agriculture, which issued the quotas.

This policy led to a rapid growth in China's seafood imports, including higher-value seafoods such as live lobster from Australia and New Zealand, live geoduck clams from Canada, Dungeness crab from the Pacific Northwest, farmed salmon from Norway, and shrimp from Ecuador, Thailand, Canada and Denmark.

During this period, China also increased its imports of lower-value frozen seafoods, especially species that were similar to Chinese fish that had been overfished. The most popular species exported to China included ribbonfish from India and Pakistan, croaker from Argentina and Mexico and squid from the U.S. (California) and Argentina.

As a result of the Asian economic crisis that began in 1997, however, Beijing decided that it was in the country's best interest to limit imports in order to maintain a strong currency. At the same time, Beijing announced a crackdown on smuggling of products through illegal "gray" channels. This resulted in an increasingly strict enforcement of the duty-free quotas and a temporary decline in seafood imports.

Although customs officials have taken enforcement action against some prominent companies, including China National Fisheries Group, the largest state-owned seafood

company in China, avoidance of customs tariffs remains commonplace and the full duty is still not paid on most of the imported seafood that goes into China. Importers routinely state lower values for their imports, which reduces their effective duty rate.

And because the quantities are relatively small—and hence easily smuggled – live lobster from Australia and New Zealand, geoduck clams from Canada, Dungeness crab from the Pacific Northwest are still flown to Hong Kong and smuggled into the adjacent Guangdong Province.

In addition, the seafood reprocessing industry in northern China imports raw material from around the world duty free, because the finished products are exported. However, the processing companies often understate their finished yield and sell the extra product in China. This can be very lucrative since the companies can make a 20 or 30 percent margin on this product.

At the same time, China has decided to increase the enforcement of tariffs on seafood, it has started to lower them. From a level of 40 percent or higher in 1995, by the year 2000, many seafood tariffs had been lowered to an average level of about 20 percent. However, in addition to standard imports, China also imposes a value-added tax on seafood of approximately 17 percent.

Table 14. China's Imports of Canadian Seafood

	Metric Tonnes	C$ Million
2000	14,670	111
1999	12,936	97.8
1998	9,269	67.3
1997	7,532	57.2
1996	5,878	44.5
1995	4,522	56
1994	2,901	37.2
1993	920	14.2
1992	835	5.6
1991	537	6.4
1990	834	3.5

Source: DFO

In spite of the increased payment of tariffs, China's seafood imports have again started to grow, reaching a record 1.87 million metric tons in 2000. The actual volume of China's seafood imports, however, is much higher than the reported figures because of the large volumes of seafood that are smuggled.

In terms of volume, Russia, Argentina, the U.S., Japan and South Korea are the leading suppliers. In the case of the Canada, seafood exports to China have grown to more than 111 (Can $) million a year, making China the third most important market for Canadian seafood exporters.

Chinese Seafood Distribution

In spite of the complexity of China, seafood distribution in this huge country is relatively straightforward. Most major cities have at least two large wholesale markets, one for fresh and live seafood and another for frozen seafood. Wholesalers operate stalls and purchase product directly from domestic producers, including fishermen and fish farmers, and importers who bring seafood in from other countries on a regular basis. Some of these markets are quite large. The wholesale market in Guangzhou, for example, sells more than a thousand tonnes of live seafood every day.

As China's seafood consumption has grown, more and more cities have built or plan to build more modern wholesale seafood markets. These wholesale markets serve a wide variety of customers from retail and restaurant buyers to consumers. In addition, secondary distributors in outlying cities that do not have wholesale seafood markets will also buy their product at these markets and then transport it and sell it to restaurant and retail customers in their city.

High value live and fresh seafood that is smuggled into China is also sometimes sold at various wholesale markets, particularly in the southern ports of Yantian near Shenzen and Guangzhou, and then sold to buyers in other parts of China.

China's Seafood Processing Industry

China has developed the world's largest secondary seafood processing industry, which is centred in the northeastern cities of Qingdao and Dalian, although some secondary seafood processing is done in other coastal cities as well. This industry developed after 1990, when Chinese processors began buying headed and gutted Alaska pollock caught by Russian fishing boats that were able to sell their catch on world markets following the collapse of the Soviet Union. The pollock was filleted by hand using inexpensive Chinese labor and sold to markets in the U.S., Japan and Europe.

More and more secondary seafood reprocessing continues to be done in China, as labor costs and lack of an adequate labor pool is forcing developed countries to do their secondary seafood processing offshore. In addition, the growth in sales of more convenient, value-added seafood products is accelerating this trend.

Between 1999 and 2000, Chinese seafood exports, most of which are reprocessed seafood, increased 15 percent to a record 1.5 million metric tonnes. The importance of China as an international seafood supplier can be seen in the growing volume of U.S. imports from China. Since 1995, the volume and value of U.S. imports of Chinese seafood have grown from 97,000 metric tonnes worth $313 million to 181,000 metric tonnes worth $2.3 billion, making China the third leading international supplier of seafood to the U.S. market.

The decline in catches of pollock and other groundfish from the Russian Far East over the past two years has motivated China's seafood processing industry to diversify the types of products it reprocesses. Significant quantities of Chilean sea bass, hoki, orange roughy, squid, salmon, herring, shrimp are all now being imported, processed and re-exported to markets, primarily in the U.S. and Europe. China has also begun to produce salted cod and pollock for world markets.

6. Forecast World Seafood Supply and Demand

Long-Term Global Outlook[17]

Forecasts for global consumption of fisheries and aquaculture products are very complex to develop since consumer behaviour varies widely between regions, countries or continents for a very broad range of products. Forecasts must also factor in estimates of growth in world population and income per capita, which also vary widely. However, FAO (Ye, 1999) has developed the best model currently available, based on historic consumer and each country's Gross Domestic Product, which then pools results by continent.

Based on this analysis, FAO estimates that global human consumption of fisheries products will reach about 183 million tonnes in 2030, a growth rate of about 2% a year starting in the year 2000.

Working from this forecast of human consumption, we extrapolated aquaculture output in 2030 based on the following assumptions:

Commercial fisheries landings, in the opinion of all experts, will stabilize around 100 million tonnes a year.

Output of fish meal and fish oil will also stabilize, which presumes that growing demand for these products to produce feed for stock will be largely met by inputs from other sources, such as vegetable protein meal.

Demand for and production of aquatic plants are not considered.

Figure 29 shows aquaculture output (except aquatic plants), commercial fisheries landings, human consumption, production of fish meal and fish oil, and apparent total demand for fisheries products based on actual historic data for 1995-2000 and FAO forecasts for 2030.

Based on the FAO model and the assumptions described above, it appears that world aquaculture output should be 118 million tonnes in 2030 to meet demand, a tripling of output compared to that for the year 2000, or an average annual growth rate of about 4%. Although this sustained growth over such a long period may appear rather optimistic, it is important to note that this rate represents less than half the annual growth rate from 1995 to 2000, which was 8.5% (excluding production of aquatic plants).

When applied to Canadian output in 2000, this growth rate provides Canadian output of about 400,000 tonnes in 2030. We find this to be a very conservative forecast in light of the recent growth of aquaculture in Canada and forecast demand for salmonids in the North American market alone.

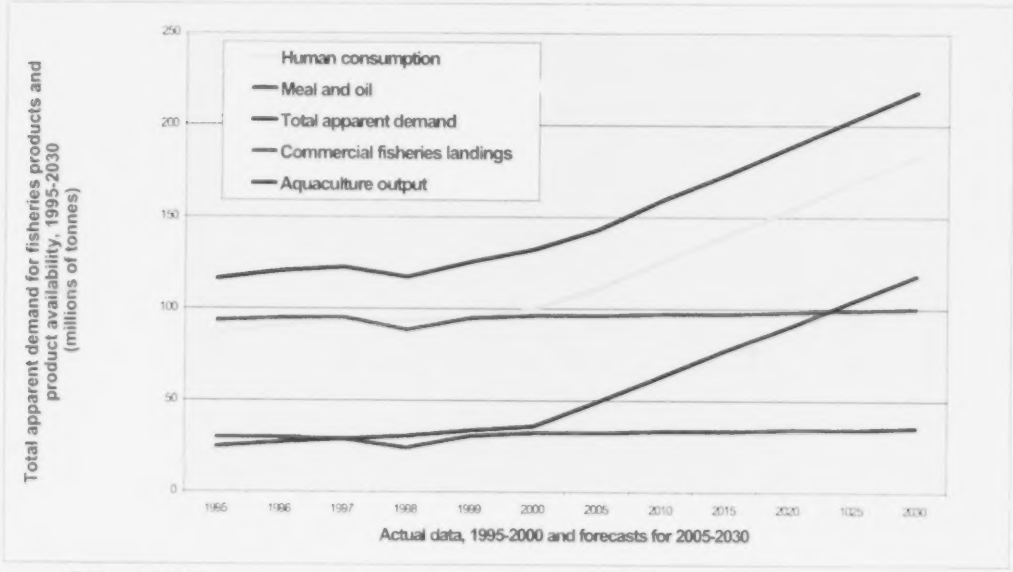
The FAO forecasts also set the annual growth rate for agriculture worldwide at 1.8% from 2000 to 2010, a rate slightly greater than the 1.6% rate from 1986 to 1995. If we

[17] Excerpted from: Gilbert, E. The International Context for Aquaculture Development: Growth in Production and Demand, and Long-Term Outlook. Office of the Commissioner for Aquaculture Development, Ottawa. 2001.

consider the forecast growth in global population, growing concerns about consumer health and well-being around the world, and the fact that commercial fisheries landings around the globe have plateaued, we find that aquaculture will have to play a growing role in food security in coming decades.

Thus, aquaculture will be the main source of supply for fish in 2030, and less than half of all marine food will come from capture fisheries.

Figure 29. Actual and Forecast Aquaculture Output and Commercial Fishery Landings



Source: Gilbert (2002)

Given the geographic distribution of current aquaculture output, each country's wealth and forecast output, FAO (2000) notes that:

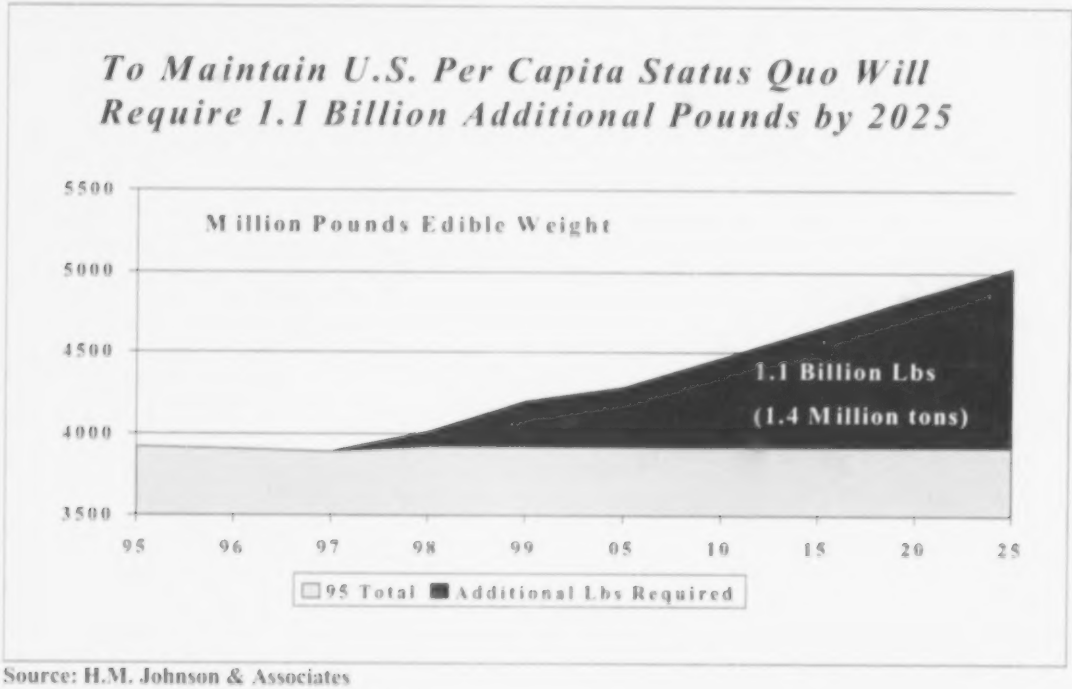
- In the wealthy countries, a growing proportion of fish consumed will be imported, and since these countries will want to buy fish at the lowest possible cost, most obstacles to trade will likely be eliminated in the developed economies.
- Aquaculture will undergo geographic expansion, in terms of species grown and technology used.
- It is highly unlikely that Asia will continue to dominate production as heavily as in the 1990s.
- Mariculture will represent a greater share of total production, especially if deep-sea aquaculture technology becomes viable.
- Through economic growth over the next 30 years, a growing number of people will eat fish regularly and repeatedly.

Conclusion

The 2002 FAO publication titled "Agriculture: Towards 2015/2030" reports that world fish consumption, on a per capita basis, is expected to continue to rise. According to the FAO, if income growth and dietary changes were the only considerations, total seafood demand would reach 183 million tonnes by 2030 or almost double current levels. However, given supply constraints, the FAO sees a more likely demand of 150 to 160 million tonnes with aquaculture accounting for 60 to 70 million tonnes.

Demand for seafood is expected to decline over time in both Japan and Western Europe due to population decreases. Much of the demand increase will come from China. The United States will require substantial increases in seafood supply to maintain current consumption levels. Using 15 pounds per capita as a base, and growing population as forecasted by the U.S. Census Bureau, the U.S. will need an additional one billion pounds of seafood (edible weight) by the year 2025 to maintain current consumption levels. On a round weight basis this increase in supply represents approximately three billion pounds or 1.4 million tonnes.

Figure 30. Forecast U.S. Seafood Demand



Source: H.M. Johnson & Associates

The United States will remain a strong market for seafood well into the century and will require ever-increasing imports to maintain adequate supplies to meet future demand. Canada is well positioned to continue being a leading supplier to the United States.

Section III:
Trade Barriers for Canadian Seafood Products

1. United States

Since the passage of the North American Free Trade Act (NAFTA) in 1988, Canadian seafood products enter into the U.S. duty free. However, over the past decade U.S. seafood producers have been successful in pursuing dumping cases against overseas seafood producers.

In 1991, salmon farmers in Maine (one of which is Canadian) were successful in pursuing an action against Norwegian farmed salmon producers, even though Norwegian salmon sold for a premium on the U.S. market. The action resulted in a tariff of 27% on fresh whole Norwegian salmon, which led to a rapid drop in Norwegian salmon exports. At the same time, U.S. imports from Canada and Chile started to rise. Today, Norway has less than a 5% share of the U.S. farmed salmon market in spite of the fact that fillets enter into the U.S. duty free.

U.S. salmon farmers also brought a dumping action against Chilean salmon farmers in 1997, however, they were less successful and, in 1998, a small (4 to 7%) duty was imposed on some of Chile's salmon companies, while no duty was imposed for others.

Another dumping action by U.S. salmon farmers is less likely in the future. Most of the salmon farms in the U.S. are owned by large companies that also have operations in Canada and Chile. Hence, a dumping action brought by their U.S. operations would hurt them more than it would help them.

The greatest threat to Canadian farmed salmon exports to the U.S. would be a dumping or injury action that was filed on behalf of U.S. salmon fishermen. Although there has been considerable talk in Alaska, where the salmon industry is indeed suffering, to date no actions have been filed.

In recent years, the number of dumping actions brought by U.S. seafood producers has increased. In 2000, a Maine mussel producer brought a case against P.E.I. producers, although this suit was withdrawn following a rise in mussel prices.

In 1996, U.S. crawfish producers brought a complaint against Chinese crawfish producers that resulted, a year later, in a tariff of 92-202% being imposed on cooked Chinese crawfish meat. However, since the tariff only applied to certain producers, the Chinese were able to get around the tariff by exporting product through plants that did not have to pay a duty. As a result, since 1997, U.S. imports of Chinese crawfish meats have grown from about 1,000 metric tonnes to more than 4,000 metric tonnes.

With the assistance of the U.S. government, shrimp fishermen on the West Coast are currently attempting to bring a dumping action against coldwater shrimp producers in Atlantic Canada. The sharp increase in U.S. imports of Canadian shrimp meat has resulted in very low ex-vessel prices on the West Coast, which, of course, has had a negative impact on fishermen. U.S. shrimp processors, some of whom also sell

Canadian shrimp meat, have not indicated they will join the action with fishermen. If successful, however, a dumping tariff could have a negative impact on Canadian shrimp exports to the U.S.

Catfish farmers in the southeastern U.S. are currently pursuing a dumping claim against Vietnamese catfish producers, which was filed in the summer of 2002.

In yet another possible case, U.S. shrimp producers in the southeast are attempting to organize and file a claim against farmed shrimp producers. An interesting twist in this case is that this year, the state of Louisiana started requiring that all Chinese shrimp and crawfish be tested for traces of the banned antibiotic chloramphenicol after traces were found by EU regulators in January (the EU subsequently banned the importation of Chinese shrimp and crawfish). The testing requirement has led a number of chains such as Wal-Mart to stop carrying Chinese shrimp and crawfish in their Louisiana stores.

This development is interesting, as it has in effect created a non-tariff trade barrier at the state level. Following Louisiana's action, some other southeastern states also enacted similar regulations.

The flurry of activity in dumping cases has been due in part to passage by the U.S. Congress of the Byrd Amendment in 2001, which gives part of the tariffs collected to the parties that file the dumping lawsuit. However the WTO recently ruled the Byrd Amendment was illegal, which should reduce the incentive somewhat.

Nevertheless, U.S. trade policy is not as "free-trade" as it has been over the past decade and, as a result, it is likely that Canadian and other seafood producers will have to be prepared to fight skirmishes in the U.S. if the importation of their products has a negative effect on segments of the U.S. seafood industry. Aggressive generic marketing is one defensive approach although it didn't work for the Norwegians. Had Vietnam developed a unique name for their fish, as New Zealand did with orange roughy, they could have promoted that "brand" without fear of retaliation by catfish farmers. They could even have positioned the fish as a "substitute" for catfish without calling it catfish.

2. The European Union

The EU has an extensive system of tariffs and quotas that has proved to be a disadvantage to Canadian seafood exporters. The purpose of the EU tariffs and quotas is, of course, to protect EU producers. The EU also grants preferential tariffs to developing countries. The high tariffs are believed to be a primary reason Canadian seafood exports to the EU have fallen over the past 10 years. In general, EU tariffs are much higher on processed seafood products.

As Canada and EU countries produce some of the same seafood products, the EU tariffs have hindered access to the EU market for Canadian producers. The clearest example is the EU tariffs on coldwater shrimp (*Pandalus borealis*), which is also produced by EU countries. The EU tariff on cooked and peeled coldwater shrimp meat is 20%, for example, making Canadian product uncompetitive.

Although EU duties on most Canadian seafood products fall within the range of 12 percent to 23 percent, some progress has been made on opening up the EU market to imported seafood products. For example, the EU has reduced tariffs on some groundfish products to 7.5%.

The Canadian government has also made some limited progress in opening up the EU market for coldwater shrimp. In March 2000, the EU increased the amount of cooked and peeled coldwater shrimp meat that can be imported annually at a reduced tariff of 6% to 5,000 metric tonnes, an increase of 1,000 metric tonnes. As this quota is open to any shrimp producer, however, it is of limited benefit to Canada.

The EU also uses technical regulations and standards to restrict seafood trade on some occasions. For example, the EU requires that only the European sardine (*Sardina pilchardus Walbaum*) can be labeled simply as canned sardine. This prevents Canadian canned sardines made from juvenile herring from being sold in the EU as sardines.

Canada and other seafood exporting countries will continue to push for additional reductions in EU tariffs and other obstacles that reduce seafood trade with the EU. And although further reductions are likely, they will likely be only incremental.

3. Japan

Japan has a variety of tariff and non-tariff barriers that limit its seafood imports in order to protect the interests of Japanese seafood producers and importers. In addition to tariffs, Japan has import quotas on certain species.

Japan also uses non-tariff barriers including health, sanitary and product safety regulations to restrict seafood trade. For example, to protect the interests of its tuna industry, Japan prohibits the importation of seafood processed with carbon monoxide (CO) on safety grounds, although the U.S. FDA does not see this as a health risk and allows the importation of seafood processed with CO.

In cases where an imported seafood item is in demand in Japan and this product is not produced by the Japanese seafood industry, the tariffs are very small. The Japanese tariff on frozen Pacific salmon, for example, is just 5%. Japan's tariff on fresh salmon, which is 3.5%, is even lower.

Most of the Canadian seafood exported to Japan is subject to tariffs that can range from very low to moderate tariffs of 10% on products like salted herring roe. These tariffs are not a major limiting factor on the volume of Canadian seafood exports to Japan, however, they do add costs to the products which can limit consumption.

In the future, Japan can be expected to face increased pressure from seafood exporting countries to lower its tariffs. However, while Japan has reduced some tariffs and non-tariff barriers it has done so only begrudgingly. There is little to indicate that Japan's policy on this matter will change in the future.

4. China

The world's most populous country has a Byzantine system of high tariffs that are sporadically applied or ignored that greatly reduces the huge potential of this market for Canadian seafood exporters.

Although China has always had high tariffs on imported seafood, during the mid-1990s, these tariffs were rarely applied to imported seafood products, which led to a rapid increase in imports. At that time, China's large state-owned fishing companies were granted quotas that allowed them to import the same amount of seafood that they caught in overseas joint ventures duty-free to China. The duty-free, or "self-catch" quota was an inducement for Chinese fishing companies to participate in joint ventures overseas.

These duty-free quotas, which were supposed to be for the same species caught in the joint venture, were widely abused with the knowledge of the Ministry of Agriculture, which granted the quotas. Instead of being used to import the same species, they were used for a wide variety of species, including high-value seafoods like live lobster, crab and geoduck clams not caught by Chinese companies. The fishing companies also routinely sold these quotas to private importers, which was a clear violation of the rules.

Beginning in 1998, with the advent of the Southeast Asian economic crisis, Beijing attempted to slow the rapid increase in imported products in a successful effort to avoid devaluing its currency (the yuan), which is pegged to the U.S. dollar. This has resulted in increasingly strict enforcement and reduction of the duty free quotas.

As a result, instead of entering China directly, much of the high-value seafood is diverted to Hong Kong or Taiwan, where it is then smuggled into China. Higher-volume, lower-value items are often imported under invoices that showed a much lower value. In addition, reprocessing companies in China, which import raw material duty free, reported much lower processing yields in order to sell raw material duty free to the domestic market.

Since 1998, China has reduced the tariffs on most imported seafood by an average of more than 30%, to an average level of about 25%. In addition, a value-added tax of about 17% is levied on importers. As a result, the effective official tariff is more than 40% on most imported seafood items.

Nevertheless, most Chinese importers avoid paying the whole duty. In addition to outright smuggling, importers routinely bribe customs officials to approve lower invoice values.

As a condition of joining the WTO, China agreed to lower its seafood tariffs to 10% or less by 2004. However, the value-added tax will remain in effect. Although these lower tariffs will reduce the incentive to smuggle, they will also reduce China's potential demand for imported seafood by adding cost.

If the Chinese government continues its reforms and becomes more transparent, it is likely that tariffs on many imported seafoods will be reduced further. Under the current system, the main beneficiaries are the smugglers and customs officials who are bribed, since relatively little tariff revenue is actually collected by the government.